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Indicators everywhere: The new accountability of agricultural policy?

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Contents

- LIST OF ABBREVIATIONS..... II**

- ABSTRACT 3**

- 1 INTRODUCTION..... 3**

- 2 LITERATURE REVIEW ON AGRICULTURAL INDICATOR SYSTEMS..... 5**
 - 2.1 GENERAL STRUCTURE OF OBJECTIVES AND INDICATORS 5**
 - 2.2 DEFINITION OF AGRI-ENVIRONMENTAL INDICATORS 6**
 - 2.3 PERFORMANCE EVALUATION OF THE CAP 7**
 - 2.4 COMPARISON OF CAP AND SDG INDICATORS..... 10**

- 3 COMPARATIVE ANALYSIS OF CAP AND SDG INDICATOR FRAMEWORKS**
11
 - 3.1 METHODOLOGICAL APPROACH..... 11**
 - 3.2 DESCRIPTION OF THE CURRENT AND FUTURE CAP OBJECTIVES AND INDICATORS**
12
 - 3.3 ASSESSMENT OF OBJECTIVES AND INDICATORS 13**
 - 3.4 ALIGNMENT OF FUTURE CAP AND SDG 15 (“LIFE ON LAND”)..... 14**

- 4 RESULTS 16**

- REFERENCES III**

- ANNEX..... III**

List of Abbreviations

CAP	Common Agriculture Policy
CMEF	Common Monitoring and Evaluation Framework
EC	European Commission
EU	European Union
MS	Member States
OECD	Organization for Economic Co-Operation and Development
R.A.C.E.R	Relevant, Accepted, Credible, Easy, Robust
S.M.A.R.T	Specific, Measurable, Accepted, Relevant, Time-bound
SDG	Sustainable Development Goals
UN	United Nations

Indicators everywhere: The new accountability of agricultural policy?

Abstract

232 indicators have been selected to monitor the Sustainable Development Goal (SDG) implementation (UN 2018), the European Union (EU) Common Monitoring and Evaluation Framework (CMEF), introduced with the aim of measuring the performance of the Common Agricultural Policy (CAP) implementation of the CAP reform 2014-2020, counts 45 context indicators, 84 output indicators, 41 result indicators, 24 target indicators and sixteen impact indicators (EU COM 2018).

Questions such as overlap and synergies between different indicator systems, but also questions regarding the appropriate choice and targeting of chosen indicators (e.g. environmental issues or state of animal welfare) or lack of indicators for specific context and fields of controversies (e.g. external dimension of the CAP) arise.

This work aims to address questions of choice, overlap and synergies across different indicator systems with a focus on CAP indicators and the SDG indicator system. Special attention is to be given to the proposed agri-environmental indicators. In a comparative, descriptive analysis, we qualitatively compare the indicator systems provided for the measuring of the EU agricultural sector and SDG performance and identify synergies, overlap or lack of alignment.

The results further the understanding of synergies and linkages between the indicator systems and facilitate an informed policy debate about potential achievement of policy goals.

1 Introduction

The most recent reform of the European Union's (EU) Common Agricultural Policy (CAP) were carried out in 2015 (European Commission, 2018f). Since then, the Sustainable Development Goals (SDGs) and the Paris climate agreement were adopted and notable extreme climate events and variability became acutely relevant for EU farmers and governments and shifted their political needs and priorities (European Commission, 2018f). In addition, deficiencies with the CAP 2014 reform, for instance regarding complicated implementation which caused high bureaucracy and expenses, ineffective or missing indicators and the failure to concentrate on results and performance (European Commission, 2018g; Fährmann & Grajewski, 2018) also internally raised the pressure to improve performance, accountability. This holds for internal issues such as social and economic coherence, environmental aspects as well as insufficient external coherence between the CAP and international goals and obligations (Pe'er et al., 2017).

Discussions about how to improve the CAP beyond 2020 started in 2017 with the communication of the European Commission (EC) "The Future about Food and Farming" (European Commission, 2017b) Additionally, in 2018 the EU published the official proposal for the CAP 2021–27 (European Commission, 2018f). This proposal (COM (2018) 392) is introducing the element of strategic planning. This means that member states (MS) should formulate individual strategic plans for the achievement of the CAP's goals, hence, the quality of the strategic plans depends on the MS and their commitment to the CAP's goals. The performance of the MS will be evaluated against a revised set of monitoring indicators. (Erjavec, Lovec, Juvančič, Šumrada, & Rac, 2018; European Commission, 2018f).

An adequate system of indicators is necessary for the monitoring of the effectiveness of policies (Wilson & Buller, 2001). Especially as the focus of policies shifts more to environmental issues (Yli-Viikari et al., 2007) However, the EU monitoring framework was often criticized for being too general and may therefore not be able to evaluate performance and potential improvements (European Commission, 2018g; Pe'er et al., 2017; Wilson & Buller, 2001). This was especially voiced for agri-environmental policies that interact with and sometimes are hindered by agricultural support measures (Pe'er et al., 2017).

Meanwhile in September 2015, the United Nations (UN) General Assembly implemented the Sustainable Development Goals (SDG) and in 2016, the EU officially announced its commitment to the goals (European Commission, 2016; United Nations, 2015b). Agriculture is an important aspect of the SDGs due to the goals that support sustainable farming, land and water usage (Pe'er et al., 2017). Consequently, the SDGs can only be accomplished, if they are strongly supported and coherent with CAP objectives.

This work aims to address questions of choice, overlap and synergies across different indicator systems with a focus on CAP indicators and the SDG indicator system. Special attention is to be given to the proposed agri-environmental indicator due to the fact that the proposal of the EC stresses that special emphasis has to be put on climate and environmental objectives (European Commission, 2018f). Moreover, it sheds light on the following questions: What are the indicators measuring? Are the revised indicators proposed to be used to monitor the CAP post 2020 an improvement or rather a step backwards? In a comparative, descriptive analysis, we qualitatively compare the indicator systems provided for the measuring of the EU agricultural sector and SDG performance and identify synergies, overlap or lack of alignment.

This paper is divided into three parts: First, the literature review gives general information about indicators and the EU monitoring system. Second, the analytical part and the discussion compares and debates first, future CAP objectives and indicators, then these objectives and indicators are compared with the United Nations (UN) Sustainable Development Goal 15 (SDG) objectives and indicators. In the last section, the paper concludes.

2 Literature Review on Agricultural Indicator Systems

The following chapter gives general information about objectives and indicators in agri-environmental policy schemes. Then, the performance evaluation system of the CAP 2014 – 20 and revised evaluation and monitoring framework of the proposal of the CAP beyond 2020 is presented, therefore literature mainly provided by the EU is used for the second part. Furthermore, a literature review on the comparison of CAP and SDG is given.

2.1 General Structure of Objectives and Indicators

Indicators are tools to accumulate and organize knowledge and, at the same time, societal and political standards and priorities are expressed (Rametsteiner, Pülzl, Alkan-Olsson, & Frederiksen, 2011). Principally, indicators are needed to assess objectives or to describe situations. In the literature, there are many suggestions of indicator criteria (White, McCrum, Blackstock, & Scott, 2006). The following list shows the characteristics of a good indicator identified by several authors (White et al., 2006):

- Measurable–necessary data available/can be collected
- Sensitive- to spatial and temporal change
- Economically viable- cost effective
- Acceptable and accessible
- Useable and easily interpreted
- Reliable and robust
- Verifiable and replicable
- Participative process- meets the needs and interest of target audience
- Specific- clearly relate to outcomes
- Timely- show trends over time
- Transparency in methodology and selection
- Relevant- to local, regional, national policy and to local concerns
- Scientifically well-founded

As seen above, a good indicator has to fulfill many criteria. However, Wilson and Buller (2001) argue that, these criteria are difficult to achieve as indicators are simplifications of processes that are complex. Another difficulty is the subjectivity of some indicators. This accounts, for example, for the attributes of policy relevance as relevance can vary from person to person, according to their objectives. Furthermore, Wilson and Buller (2001) note, that trade-offs have to be made in the selection of suitable indicators due to the fact that indicators also have to be practicable, appropriate and manageable in a working environment that has monetary, time and personnel restrictions.

The EU picked up on this theoretical discussion in the *better regulation toolbox* framework that provides guidelines and tips on how to set objectives (European Commission, 2017a). . In this *toolbox*, the EC empathizes that objectives should be S.M.A.R.T. (European Commission,

2017a). The S.M.A.R.T objectives (see Table 1) concept is also used by other organizations like OECD and UN. (OECD DAC, 2010; United Nations, 2015a).

Table 1: S.M.A.R.T criteria for objectives

Specific	exact and concrete objectives, that cannot be differently interpreted
Measurable	that objectives can be measured; hence they are quantifiable
Achievable	Objectives should not be overambitious
Relevant	objective has a relation to the problem and its origins
Time-bound	a specific date or period in time where the objective should be achieved

Source: own design, data from European Commission, 2017a, page 100

Furthermore, the guideline of the EC states that “when objectives are multiple and interrelated, it is important to highlight the links between them, particularly any possible trade-offs. When problems are complex and have many underlying drivers, numerous objectives are often identified, be they general, specific or operational. In these cases, an ‘objectives tree’ can be used to depict graphically the relations among different goals” (European Commission, 2017a, p. 101). Regarding indicators, the EC recommends to formulate indicators according to a set of criteria, named R.A.C.E.R., as outlined in Table 2 (European Commission, 2017c).

Table 2: R.A.C.E.R. criteria

Relevant	Indicators have to be closely linked to the objectives. Do impact indicators really refer to impacts and result indicators to results?
Accepted	Indicators have to be accepted by stakeholders
Credible	Indicators have to be explicit and easy to interpret for non-experts
Easy	Indicators have to be easy to monitor
Robust	They have to be usable in long term and hard to be manipulated

Source: own design, data from European Commission, 2017c, page 14

2.2 Definition of Agri-Environmental Indicators

Indicators for agricultural and environmental entities are important due to their linkages that are more complex than between many other economic activities (Wilson & Buller, 2001). However, the term *indicator* has diverse

meanings in different contexts (Heink & Kowarik, 2010). Therefore, we emphasize the definition of environmental indicators according to the Organization for Economic Co-Operation and Development (OECD) as follows: "Indicators can be used at international and national levels in state of the environment reporting, measurement of environmental performance and reporting on progress towards sustainable development. They can further be used at national level in planning, clarifying policy objectives and setting priorities" (OECD, 2003, p. 4).

Hence, they are an instrument for policy-makers and for assessing international and national performances (OECD, 2003). However, indicators are limited to entities that are countable and can be expressed in numbers (Wilson and Buller, 2001). This is a problem especially for agri-environmental indicators, as Wilson and Buller (2001) argue. It is difficult to measure complex indicators like "loss of scenic beauty of agri-cultural landscapes" (Wilson & Buller, 2001, p. 300). Therefore, a complete assessment of agri-environmental problems by indicators is not possible and in their use, their restricted assessment capabilities must be accounted for.

2.3 Performance Evaluation of the CAP

In 2000, the EU first implemented agri-environmental indicators into the CAP due to the increasing awareness of environmental problems caused by agriculture (European Commission, 2001). These former indicators only monitored the second pillar (rural development), but this changed with the CAP 2014 – 20 (European Commission, 2017c). From 2014 on, there is the Common Monitoring and Evaluation Framework (CMEF) for performance monitoring of pillar one and two (European Commission, 2017c). The objective of this framework is to monitor all measures and instruments of the CAP and to optimize the policy cycle for better policy realization and evaluation (OECD, 2017)

The CAP has three general objectives and the performance of the CAP is measured in relation to these: 1) viable food production, 2) sustainable land use and climate change and 3) rural development (European Parliament, 2013). The indicators of the CMEF are the key tools and organized in four categories shown in table 3.

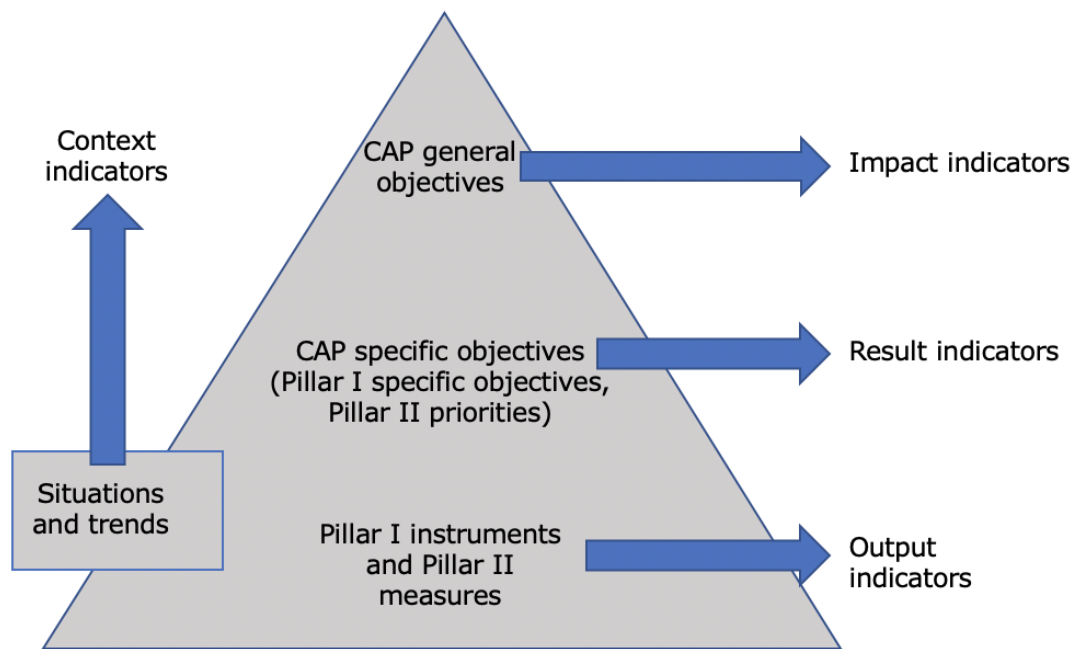
Table 3: Definition of indicator types

Category	Description	Example
Context Indicator	- description of general background relevant to the policy	- Amount of arable land - Livestock units, farm labour force,
Output Indicator	- income support and market measure	- number of farmers supported by payment schemes
	- monitoring EU policies on rural development	- public expenditure for investment
Result Indicator/ Target indicator	- income support	- measure direct effects of interventions, like crop diversity on a farm or area under Greening
	- rural development	- effect of rural development policies (Increasing efficiency in water use by agriculture, soil management)
	- target indicators used to set quantified objectives	- at the beginning of the programming period, correspond to rural development result indicators
Impact Indicator	- impact of policy interventions for the longer term and when there are effects beyond the immediate period	- emissions from agriculture, water quality,

Source: Own design, data from European Commission, 2019a, website

Figure 1 illustrates the indicator hierarchy. Different categories of indicators are needed to assess the performance of the CAP on different levels. The three general objectives are measured and evaluated with the help of impact indicators, whereas the specific objectives with the help of result indicators. The measurement of Pillar I instruments and Pillar II measures is done on the basis of output indicators. The context indicators are needed due to the fact that other aspects like global market prices, economic development and climate have impact on the CAP. Therefore, context indicators describe the general circumstances in which the agricultural policies of the EU operate (European Commission, 2017c).

Figure 1: Hierarchy of indicators



Source: own design, information from European Commission, 2017c

The EC (2017c) states that often several measures or instruments contribute to achieve one objective and one instrument or measure can contribute to several objectives. Vice versa, often one indicator can be used to assess multiple related objectives.

The report of the EC (2018g) about the CMEF states that there are in total 45 context indicators, 84 output indicators, 41 result indicators, 24 target indicators and sixteen impact indicators. Furthermore, there are about 900 sub-indicators for splits, for instance, if data per sector is needed. The information is mostly gathered by MS due to a shared management of the CAP by MS and EU (European Commission, 2018g). The CMEF provides information about each indicator that is used. This information contains, amongst other things, the definition of the indicator, source of the data and the frequency of reporting the data (OECD, 2017). Also, the indicators are improved over time due to constant assessment of their usability and feasibility by the EU (OECD, 2017).

The EC (2018g) notes, that the number of indicators is too high, and some are not appropriate due to their frequency of reporting, for instance, there are indicators, which only provide data on a yearly basis. This means that these indicators cannot be used for early monitoring. Furthermore, the EC (2018g) complains that there are indicators that only have a poor link with the CAP and other indicators are not existing, which would be important to have, for example, indicators that give reliable data on the realization of the CAP in relation with its impacts on climate change. Also, it is important to mention, that MS sometimes struggle in the first years of implementation to submit the report of the data correctly. Therefore, there is a mechanism that warns MS about possible mistakes before they submit the report.

Nevertheless, the MS are not obliged to correct the data after they were informed about possible errors (European Commission, 2018g).

In the proposal COM(2018) 392 of the EC (2018f) the focus of the CAP beyond 2020 shifts from compliance and rules to performance of the MS and results. This requires more flexibility for MS, which decide on their own how to achieve the general objectives. The new framework is than the performance monitoring and evaluation framework with a single set of objectives for pillar one and two. The performance of the MS will be evaluated several times a year on the basis of impact indicators and there will be a yearly follow up of the policy performance on the basis of result indicators. Output indicators should than link the performance of the policy implementation with its costs. This new framework reduces the amount of indicators from 141 to 101, this number excludes context indicators, which remain unchanged (European Commission, 2018g).

2.4 Comparison of CAP and SDG Indicators

In 2015, the UN General Assembly adopted the seventeen SDGs (United Nations, 2015b). There were 232 indicators selected to monitor the goals (United Nations, 2019). According to the *The Future of Food and Farming* communication of the EC (2017b) the EU agricultural policy supports the SDGs and have have large overlap with the objectives of the EU agricultural policy (European Commission, 2017b) (see Figure 2).

Figure 2: Alignment of CAP and SDG

THE CONTRIBUTION OF THE CAP TO THE SDGs



Source: European Commission, 2017b, p. 8

In a report by Pe'er et al. (2017), it is argued that the CAP indeed supports some goals like SDG 1 (no poverty) and SDG 2 (no hunger), if examined

from the perspective within the European Union¹. However, the authors found tradeoffs and divergent interests between CAP and SDG's, too. According to them, the CAP has, for example, only partial impact on the improvement of SDG 8 (sustainable growth) due to the encouragement of organic farming on one hand and support of unsustainable agricultural systems on the other. The authors voice that especially environmental goals like SDG 6 (clean water) and SDG 15 (life on land) are not sufficiently supported by the current CAP, mainly due to limited funding and weak policy design (Pe'er et al., 2017). Therefore, it is concluded by Pe'er et al. (2017) that the current CAP does not fully support the SDG's.

Hence, apart from the question regarding the overlap in the indicator systems used for the reporting on SDGs and CAP, there is also the topical question if and by how much the CAP contributes to the achievement of the SDGs. A tailored and targeted reporting system should be able to show and measure synergies, trade-offs and divergent trends between the two objective. This is what is going to be analysed in the next section.

3 Comparative Analysis of CAP and SDG Indicator Frameworks

After introducing our methodological approach, the EU indicators systems is presented in detail. This is crucial for this work because, as mentioned before, the indicators of the CMEF should measure if the objectives of the CAP are accomplished (European Commission, 2017c). Subsequently, we critically discuss the indicators in the light of theoretical indicator design consideration. Then these objectives and indicators of the future CAP are compared with the relevant SDG objectives and indicators.

3.1 Methodological Approach

This study uses a qualitative comparative approach to compare indicator systems. In a deductive manner, we describe independently two indicator systems and subsequently, compare these systems.

The comparison focuses on the dimensions of synergies, overlap or lack of alignment as these are important issues to understand how the CAP contributes to the achievement of the SDGs. For the EU CMEF, as they are potentially going to play in important role in the performance measurement in the next CAP period, we also critically assess, if these indicators fulfill theoretical indicator design criteria.

As "material" for the analysis, we use the indicator systems provided by the EU with the CMEF and the one provided by the UN for the performance measurement of the SDGs. We reduce our data set by only focusing on that part of the indicator systems that deal with agri-environmental issues.

¹ SDG 1 and 2 are no issues in the EU, furthermore the CAP has effects outside the EU but these effects are not addressed in this report due to their complexity.

3.2 Description of the Current and Future CAP Objectives and Indicators

The proposal of the future CAP entails nine additional specific objectives (Figure3)(European Commission, 2018f). „The new CAP will pursue the following specific objectives:

- (a) Support viable farm income and resilience across the EU territory to enhance food security;
- (b) enhance market orientation and increase competitiveness including greater focus on research, technology and digitalisation;
- (c) Improve farmers' position in the value chain;
- (d) Contribute to climate change mitigation and adaptation, as well as sustainable energy;
- (e) Foster sustainable development and efficient management of natural resources such as water, soil and air;
- (f) Contribute to the protection of biodiversity, enhance ecosystem services and preserve habitats and landscapes;
- (g) Attract young farmers and facilitate business development in rural areas;
- (h) Promote employment, growth, social inclusion and local development in rural areas, including bio-economy and sustainable forestry;
- (i) Improve the response of EU agriculture to societal demands on food and health, including safe, nutritious and sustainable food, as well as animal welfare.” (European Commission, 2018f, p. 11)

Figure 3: The future CAP nine objectives



Source: retrieved from European Commission, 2019b

Additionally, the EC published explanations to these nine objectives. These four briefs provide the facts and reasoning for the objectives (European Commission, 2018c, 2018d, 2018e, 2018b).

The objectives d, e and f are the three objectives of the future CAP that contribute to climate action and saving our environment (Table 1A) (European Commission, 2019c). These three objectives are relevant for this work due to our focus on agri-environmental policies. Therefore, and for simplification, table 1A shows only these three objectives and their indicators, which are in total 12 impact indicators and 18 result indicators.

3.3 Assessment of Objectives and Indicators

The CAP objectives are formulated in a very general manner. This holds in particular for objectives d,e and f, that deal with environmental issues. This broad formulation of the objectives leaves wide scope and flexibility for implementation and measurement. Hence, the impact indicators (see Figure 2) are an important ingredient in order to narrow down what shall be achieved under the stated objectives.

Given that in the *better regulation toolbox* the EC has established guidelines on how to formulate objectives, or objective trees, in case of complex objectives with many drivers, it is somewhat astonishing that the new proposed CAP objectives are so broadly defined. They seem not to be formulated taking the S.M.A.R.T. criteria into account. They are, for example, too vague due to the lack of quantified targets and they are not time-bound, i.e. indicating how much shall be achieved with the CAP implementation period.

Looking at the set of underlying indicators, for example for objective d (contribution to climate change), the first impact indicator I.9 focuses on improving farm resilience, an sub-objective that one would rather expect under objective a instead of d. Hence, it is not explicitly specified which resilience is meant due to the fact that resilience could be economical resilience or resilience against climate phenomena. All in all, the proposed impact indicators for the objectives d, e and f are relevant, but not specific enough. Regarding the dimensions credible, easy and robust, one would have to look at the definitions of the indicators in order to see if these R.A.C.E.R. criteria hold for the given set of proposed indicators. Also, there is no time frame that says when the data is collected, and how often it will be published. Hence it is not clear, which data will be available for early monitoring.

Regarding the results indicators, the measurement layer focusing on Pillar I and Pillar II implementation, several comments can be made:

- For R.15 it is not clear why the investments in renewable energy production capacity are measured. It would be more reasonable to measure the production of renewable energy over a certain period.
- R.16 is formulated too general; is it measuring general energy savings in agriculture or those resulting from CAP policies?

- The same accounts for R.23; does it measure the share of farmers who support investment or the share of farmers who receive support for investments?
- All result indicators measure the share of something, but R.28 measures the absolute area, the reason for this is not clear to us.
- R.24 is not significant because only the receiving of support is measured and not the share of trained farmers.
- R.25 and R.26 could be put together to one indicator for simplification.

This small compilation of comments show that, at this point, several questions remain open regarding the proposed indicator system for the CAP post 2020. Given the important role of the indicators system in the proposed new delivery model, it seems advisable to address these issues in order to come up with a robust and credible monitoring system.

3.4 Alignment of future CAP and SDG 15 (“Life on land”)

“SDG 15: Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss” UN 2015b) is also referred to as *Life on Land* and the goal is directly associated with the CAP (Pe’er et al., 2017). SDG 15 is split up into 12 sub-targets

From all SDGs, SDG 15 is the most relevant one for CAP objectives d, e and f (Table 2A). Therefore, the SDG 15 and its indicators are displayed in Table 4. They are ordered in a way to show their matching CAP indicators. Also, other relevant SDG indicators dealing with environmental issues, not captured under SDG 15 are displayed in the table, next to the CAP indicator where it seemed to be best fitting.

Several observations can be made: Firstly, one obvious difference between future CAP objectives d, e and f and SDG 15 is the number of indicators. All three environmental CAP objectives have in total 30 indicators, whereas SDG 15 has in total 14 indicators for the 12 sub-targets, stated under SDG 15. Two indicators recur for related targets. Secondly, in this ordering, it is interesting to see that for many SDG 15 indicators, no correlation with a CAP indicator could be found. A large number of SDG indicators are listed below the table, as not CAP counterpart could be found. Even though at the objective level, there seems to be overlap and synergy, at the operational measurement level, there seems to be a lack of synergy. Third, regarding the definition of SDG 15 targets, they are defined in a specific, measurable, relevant and timebound manner. The indicators are relevant, because they are closely linked to the targets, they are explicit and easy to understand and monitor, also they are usable in long-term and hard to be manipulated. This is according to general indicator criteria and seems to provide at least a certain chance to be able to track and monitor SDG progress across countries. Nevertheless, contentwise, it is debatable if SDG 15 is not too overambitious and therefore not achievable.

Table 4: Comparison of CAP and SDG indicators

CAP	CAP indicators	SDG indicator
d)	I.9 Improving farm resilience: Index	
	I.10 Contribute to climate change mitigation: Reducing GHG emissions from agriculture	
	I.11 Enhancing carbon sequestration: Increase the soil organic carbon	
	I.12 Increase sustainable energy in agriculture: Production of renewable energy from agriculture and forestry	7.2.1 Renewable energy share in the total final energy consumption
	R.12 Adaptation to climate change: Share of agricultural land under commitments to improve climate adaptation	
	R.13 Reducing emissions in the livestock sector: Share of livestock units under support to reduce GHG emissions and/or ammonia, including manure management	
	R.14 Carbon storage in soils and biomass: Share of agricultural land under commitments to reducing emissions, maintaining and/or enhancing carbon storage (permanent grassland, agricultural land in peatland, forest, etc.)	
	R.15 Green energy from agriculture and forestry: Investments in renewable energy production capacity, including bio-based (MW)	
	R.16 Enhance energy efficiency: Energy savings in agriculture	
	R.17 Afforested land: Area supported for afforestation and creation of woodland, including agroforestry	15.1.1 Forest area as a proportion of total land area
e)	I.13 Reducing soil erosion: Percentage of land in moderate and severe soil erosion on agricultural land	15.3.1 Proportion of land that is degraded over total land area
	I.14 Improving air quality: Reduce ammonia emissions from agriculture	
	I.15 Improving water quality: Gross nutrient balance on agricultural land	
	I.16 Reducing nutrient leakage: Nitrate in ground water - Percentage of ground water stations with N concentration over 50 mg/l as per the Nitrate directive	
	I.17 Reducing pressure on water resource: Water Exploitation Index Plus (WEI+)	
	R.18 Improving soils: Share of agricultural land under management commitments beneficial for soil management	2.4.1 Proportion of agricultural area under productive and sustainable agriculture
	R.19 Improving air quality: Share of agricultural land under commitments to reduce ammonia emission	
	R.20 Protecting water quality: Share of agricultural land under management commitments for water quality	
	R.21 Sustainable nutrient management: Share of agricultural land under commitments related to improved nutrient management	
	R.22 Sustainable water use: Share of irrigated land under commitments to improve water balance	6.4.1 Change in water-use efficiency over time
	R.23 Environment-/climate-related performance through investment: Share of farmers with support in investments related to care for the environment or climate	
	R.24 Environmental/climate performance through knowledge: Share of farmers receiving support for advice/training related to environmental- climate performance	15.a.1 Official development assistance and public expenditure on conservation and sustainable use of biodiversity and ecosystems

CAP	CAP indicators	SDG indicator
f)	I.18 Increasing farmland bird populations: Farmland Bird Index	15.5.1 Red List Index
	I.19 Enhanced biodiversity protection: Percentage of species and habitats of Community interest related to agriculture with stable or increasing trends	
	I.20 Enhanced provision of ecosystem services: share of UAA covered with landscape features	2.4.1 Proportion of agricultural area under productive and sustainable agriculture
	R.25 Supporting sustainable forest management: Share of forest land under management commitments to support forest protection and management.	15.2.1 Progress towards sustainable forest management
	R.26 Protecting forest ecosystems: Share of forest land under management commitments for supporting landscape, biodiversity and ecosystem services	15.2.1 Progress towards sustainable forest management
	R.27 Preserving habitats and species: Share of agricultural land under management commitments supporting biodiversity conservation or restoration	2.4.1 Proportion of agricultural area under productive and sustainable agriculture
	R.28 Supporting Natura 2000: Area in Natura 2000 sites under commitments for protection, maintenance and restoration	15.1.2 Proportion of important sites for terrestrial and freshwater biodiversity that are covered by protected areas, by ecosystem type
	R.29 Preserving landscape features: Share of agriculture land under commitments for managing landscape features, including hedgerows	
Additional SDG indicators dealing with environmental issues: 15.4.1 Coverage by protected areas of important sites for mountain biodiversity 15.4.2 Mountain Green Cover Index 15.6.1 Number of countries that have adopted legislative, administrative and policy frameworks to ensure fair and equitable sharing of benefits 15.7.1 Proportion of traded wildlife that was poached or illicitly trafficked 15.8.1 Proportion of countries adopting relevant national legislation and adequately resourcing the prevention or control of invasive alien species 15.9.1 Progress towards national targets established in accordance with Aichi Biodiversity Target 2 of the Strategic Plan for Biodiversity 2011–2020 2.5.1 Number of plant and animal genetic resources for food and agriculture secured in either medium- or long- term conservation facilities		

Source: Own design, data from European Commission, 2018a; United Nations, 2017.

Notes: I. = Impact indicator; R. = Results indicator; Output indicators not displayed.

SDG 15 displayed in fat letters, all other SDG in normal letters. Green: Indicators completely align, yellow: Indicators nearly align, red: indicators do not align/not mentioned.

4 Results

In this paper we presented a literature review on agri-environmental objectives and indicators with specific focus on the current CAP and a comparison of the future CAP agri-environmental indicators and the

corresponding SDG objectives. The focus was on the agri-environmental dimension of the two indicator systems.

One interesting finding is that even though CAP and SDG both address climate change, in the respective indicator frameworks, that are proposed for the CAP or adopted in the case of the SDG for monitoring the respective progress, not much overlap can be identified. It seems that this is a missed opportunity, as better overlap and synergies in the monitoring system for CAP and SDGs would certainly improve policy formulation and accountability.

A way to align the CAP and the SDGs would be to implement EU and UN goals into the regulations of how the Commission has to assess the CAP strategic plans of each MS, as proposed by the European Court of Auditors (2019). In addition, as raised by Matthews (2019), the strategic plans within the new delivery model of the CAP could and should be used strategically to improve coherence of the internal and external dimension of EU policies with a special focus on climate and development policies.

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Annex

Table 1A: Environmental related future CAP specific objectives and indicators

Objectives	Impact indicator	Result indicator
Contribute to climate change mitigation and adaptation, as well as sustainable energy	<p>I.9 Improving farm resilience: Index</p> <p>I.10 Contribute to climate change mitigation: Reducing GHG emissions from agriculture</p> <p>I.11 Enhancing carbon sequestration: Increase the soil organic carbon</p> <p>I.12 Increase sustainable energy in agriculture: Production of renewable energy from agriculture and forestry</p>	<p>R.12 Adaptation to climate change: Share of agricultural land under commitments to improve climate adaptation</p> <p>R.13 Reducing emissions in the livestock sector: Share of livestock units under support to reduce GHG emissions and/or ammonia, including manure management</p> <p>R.14 Carbon storage in soils and biomass: Share of agricultural land under commitments to reducing emissions, maintaining and/or enhancing carbon storage (permanent grassland, agricultural land in peatland, forest, etc.)</p> <p>R.15 Green energy from agriculture and forestry: Investments in renewable energy production capacity, including bio-based (MW)</p> <p>R.16 Enhance energy efficiency: Energy savings in agriculture</p> <p>R.17 Afforested land: Area supported for afforestation and creation of woodland, including agroforestry</p>
Foster sustainable development and efficient management of natural resources such as water, soil and air	<p>I.13 Reducing soil erosion: Percentage of land in moderate and severe soil erosion on agricultural land</p> <p>I.14 Improving air quality: Reduce ammonia emissions from agriculture</p> <p>I.15 Improving water quality: Gross nutrient balance on agricultural land</p> <p>I.16 Reducing nutrient leakage: Nitrate in ground water - Percentage of ground water stations with N concentration over 50 mg/l as per the Nitrate directive</p> <p>I.17 Reducing pressure on water resource: Water Exploitation Index Plus (WEI+)</p>	<p>R.18 Improving soils: Share of agricultural land under management commitments beneficial for soil management</p> <p>R.19 Improving air quality: Share of agricultural land under commitments to reduce ammonia emission</p> <p>R.20 Protecting water quality: Share of agricultural land under management commitments for water quality</p> <p>R.21 Sustainable nutrient management: Share of agricultural land under commitments related to improved nutrient management</p> <p>R.22 Sustainable water use: Share of irrigated land under commitments to improve water balance</p> <p>R.23 Environment-/climate-related performance through investment: Share of farmers with support in investments related to care for the environment or climate</p> <p>R.24 Environmental/climate performance through knowledge: Share of farmers receiving support for advice/training related to environmental- climate performance</p>
Contribute to the protection of biodiversity, enhance ecosystem services and preserve habitats and landscapes	<p>I.18 Increasing farmland bird populations: Farmland Bird Index</p> <p>I.19 Enhanced biodiversity protection: Percentage of species and habitats of Community interest related to agriculture with stable or increasing trends</p> <p>I.20 Enhanced provision of ecosystem services: share of UAA covered with landscape features</p>	<p>R.25 Supporting sustainable forest management: Share of forest land under management commitments to support forest protection and management.</p> <p>R.26 Protecting forest ecosystems: Share of forest land under management commitments for supporting landscape, biodiversity and ecosystem services</p> <p>R.27 Preserving habitats and species: Share of agricultural land under management commitments supporting biodiversity conservation or restoration</p> <p>R.28 Supporting Natura 2000: Area in Natura 2000 sites under commitments for protection, maintenance and restoration share</p> <p>R.29 Preserving landscape features: Share of agriculture land under commitments for managing landscape features, including hedgerows</p>

Source: own design, data from European Commission, 2018a, pp. 3-5

Table 2A: Targets and indicators of SDG 15

Targets	Indicators
15.1 By 2020, ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and drylands, in line with obligations under international agreements	15.1.1 Forest area as a proportion of total land area 15.1.2 Proportion of important sites for terrestrial and freshwater biodiversity that are covered by protected areas, by ecosystem type
15.2 By 2020, promote the implementation of sustainable management of all types of forests, halt deforestation, restore degraded forests and substantially increase afforestation and reforestation globally	15.2.1 Progress towards sustainable forest management
15.3 By 2030, combat desertification, restore degraded land and soil, including land affected by desertification, drought and floods, and strive to achieve a land degradation- neutral world	15.3.1 Proportion of land that is degraded over total land area
15.4 By 2030, ensure the conservation of mountain ecosystems, including their biodiversity, in order to enhance their capacity to provide benefits that are essential for sustainable development	15.4.1 Coverage by protected areas of important sites for mountain biodiversity 15.4.2 Mountain Green Cover Index 15.5.1 Red List Index
15.5 Take urgent and significant action to reduce the degradation of natural habitats, halt the loss of biodiversity and, by 2020, protect and prevent the extinction of threatened species	15.5.1 Red List Index
15.6 Promote fair and equitable sharing of the benefits arising from the utilization of genetic resources and promote appropriate access to such resources, as internationally agreed	15.6.1 Number of countries that have adopted legislative, administrative and policy frameworks to ensure fair and equitable sharing of benefits
15.7 Take urgent action to end poaching and trafficking of protected species of flora and fauna and address both demand and supply of illegal wildlife products	15.7.1 Proportion of traded wildlife that was poached or illicitly trafficked
15.8 By 2020, introduce measures to prevent the introduction and significantly reduce the impact of invasive alien species on land and water ecosystems and control or eradicate the priority species	15.8.1 Proportion of countries adopting relevant national legislation and adequately resourcing the prevention or control of invasive alien species
15.9 By 2020, integrate ecosystem and biodiversity values into national and local planning, development processes, poverty reduction strategies and accounts	15.9.1 Progress towards national targets established in accordance with Aichi Biodiversity Target 2 of the Strategic Plan for Biodiversity 2011–2020
15.a Mobilize and significantly increase financial resources from all sources to conserve and sustainably use biodiversity and ecosystems	15.a.1 Official development assistance and public expenditure on conservation and sustainable use of biodiversity and ecosystems
15.b Mobilize significant resources from all sources and at all levels to finance sustainable forest management and provide adequate incentives to developing countries to advance such management, including for conservation and reforestation	15.b.1 Official development assistance and public expenditure on conservation and sustainable use of biodiversity and ecosystems
15.c Enhance global support for efforts to combat poaching and trafficking of protected species, including by increasing the capacity of local communities to pursue sustainable livelihood opportunities	15.c.1 Proportion of traded wildlife that was poached or illicitly trafficked

Source: own design, data from United Nations, 2017, pages 16 & 17