



# Evaluation of the Impact of the CAP on Water

Final report

EEIG Alliance Environnement  
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## Evaluation of the impact of the CAP on water

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AECM	Agri-Environment and Climate Measure
AEI	Agri-Environmental Indicators
AKIS	Agricultural Knowledge and Innovation System
ALPAD	Association Landaise pour la Promotion de l'Agriculture Durable
ANC	Areas of Natural Constraint
APRONA	Association pour la PROtection de la Nappe phréatique de la plaine d'Alsace
BEPA	Bureau of European Policy Advisors
BNI	Biological Nitrification Inhibition
BOD	Biochemical Oxygen Demand
BPS	Basic Payment Scheme
BS	Bank Stabilisation
CAP	Common Agricultural Policy
CATS	Clearance Audit Trail System
CC	Cross-compliance
CIRCABC	Communication and Resource Centre for Administrations, Businesses and Citizens
CIS	Common Implementation Strategy
CLLD	Community-Led Local Development
CMEF	Common Monitoring and Evaluation Framework
CMO	Common Market Organisation
COP	Cereals, Oilseeds and Protein crops
CP	Concentration of Pollutants
CS	Case-Study
CSWD	Commission Staff Working Document
CUMA	Coopérative d'Utilisation de Matériel Agricole
DG	Directorate-General
DP	Direct payment
EAFRD	European Agricultural Fund for Rural Development
EAGF	European Agricultural Guarantee Fund
EARF	Environmental Assessment and Review Framework
EC	European Commission
EEA	European Environment Agency
EEB	The European Environmental Bureau
EEC	European Economic Community
EEIG	European Economic Interest Group
EFA	Ecological Focus Area
EFSI	European Agricultural Fund for Rural Development
EIP	European Innovation Partnership
ENRD	European Network for Rural Development
EQS	Environmental Quality Standards
ESI Funds	European Structural and Investment Funds
ESPG	Environmentally Sensitive Permanent Grassland
ESQ	Evaluation Study Question
ESU	Economic Size Unit
EU	European Union
EUROSTAT	Statistical Office of the European Commission
FA	Focus Area
FADN	Farm Accountancy Data Network
FAO	Food and Agriculture Organization of the United Nations
FAS	Farm Advisory System
FNVA	Farm Net Value Added
FSS	Farm Structure Survey
GAEC	Good Agricultural and Environmental Condition
GCOR	Gravel Contact Oxidation Reactor
GHG	Green House Gaz

GLAS	Green, Low-carbon, Agri-environment Scheme
GM	Genetically Modified
GWA	Ground Water Area
GWB	Ground Water Body
HCH	Hexachlorocyclohexane
IACS	Integrated Administration and Control System
ICPDR	International Commission for the Protection of the Danube River
ICT	Information and Communication Technologies
IEEP	Institute for European Environmental Policy
INRA	Institut National de la Recherche Agronomique
IPM	Integrated Pest Management
IRSTEA	Institut national de Recherche en Sciences et Technologies pour l'Environnement et l'Agriculture
ISAMM	Information System for Agricultural Market Management and Monitoring
LAG	Local Action Groups
LEADER	Liaison Entre Actions de Développement de l'Économie Rurale
LFA	Less Favoured Areas
LL	Losses by Leaching
LPIS	Land Parcel Identification System
LU	Livestock Unit
MA	Managing Authorities
MCPA	2-Methyl-4-ChloroPhenoxyacetic Acid
MFA	Multifunctionality of Agriculture
MS	Member State
NAP	Nitrate Action Program
NBT	New plant Breeding Techniques
NFC	Nitrogen-Fixing Crops
NGO	Non-Governmental Organization
NRW	North Rhine-Westphalia
NUTS	Nomenclature of Territorial Units of Statistics
NVZ	Nitrate Vulnerable Zones
NWRM	Natural Water Retention Measures
OP	Operational Programme
PG-ELP	Permanent Grassland with Established Local Practices
PI	Pillar I
PII	Pillar II
PoM	Programme of Measures
POSEI	Programme d'Option Spécifique à l'Eloignement et à l'Insularité
PPP	Phyto-Pharmaceutics Products
PS	Priority Substance
RBD	River Basin District
RBM	River Basin Management
RBMP	River Basin Management Plan
RBSP	River Basin-Specific Pollutants
RDP	Rural Development Program
RDR	Rural Development Regulation
RO	Run-Off
RP	Redistributive Payment
SAPS	Single Area Payment Scheme
SCAR	Standing Committee on Agricultural Research
SE	Soil and bank Erosion
SEO	Sociedad Española de Ornitología
SFS	Small Farmer Scheme
SME	Small and Medium-sized Enterprise
SMR	Statutory Management Requirements
SoW	State of Water
SRC	Short Rotation Coppice
SUPD	Sustainable Use of Pesticide Directive



SWB	Surface Water Body
SWOT	Strengths, Weaknesses, Opportunities, Threats
TO	Type of Operation
UAA/UAL	Utilized Agricultural Area/ Utilized Agricultural Land
VCS	Voluntary Coupled Support
WA	Water Abstraction
WFD	Water Framework Directive
WISE	Water Information System for Europe
WR	Water Retention
WWAP	World Water Assessment Programme
WWF	World Wildlife Fund
YF	Young Farmer
YFP	Young Farmer Payment

## EU COUNTRY CODES

BE	Belgium
BG	Bulgaria
CZ	Czechia
DK	Denmark
CZ	Czechia
DE	Germany
EE	Estonia
IE	Ireland
EL	Greece
ES	Spain
FR	France
HR	Croatia
IT	Italy
CY	Cyprus
LV	Latvia
LT	Lithuania
LU	Luxembourg
HU	Hungary
MT	Malta
NL	The Netherlands
AT	Austria
PL	Poland
PT	Portugal
RO	Romania
SI	Slovenia
SK	Slovakia
FI	Finland
SE	Sweden
UK	United Kingdom

# 1 OBJECTIVE AND SCOPE OF THE EVALUATION STUDY

The CAP includes the objective of sustainable management of water resources in its overall objective of sustainable management of natural resources and climate action. In Article 110(2) of Regulation (EU) No 1306/2013, the three overarching priorities for the CAP over the 2014-2020 programming period were set out, against which the CAP must be evaluated:

- viable food production, with a focus on agricultural income, agricultural productivity and price stability;
- sustainable management of natural resources and climate action, with a focus on greenhouse gas emissions, biodiversity, soil and water;
- balanced territorial development, with a focus on rural employment, growth and poverty in rural areas.

This evaluation examines the impact of the CAP measures and instruments on water quantity and quality and verifies the extent to which the related specific objective has been achieved. For this purpose, the role played by the overall CAP framework on water-related issues is considered. The evaluation covers 14 evaluation study questions on causal analysis (in terms of drivers influencing the implementation choices taken by Member States (MS) and farmers), effectiveness (effects of the CAP measures and instruments on agricultural practices and related pressures on water quality and quantity), efficiency, coherence, relevance and EU added value.

Water is currently emerging as one of the most significant environmental and economic concerns in the European Union. Not only is the agricultural sector dependent on the availability of this resource in sufficient quantity and quality, but it can also represent a significant source of pressures that harms good ecological and chemical status of water as well as the quantitative status of groundwater and surface waters.

To alleviate these pressures, the CAP provides guidance, instruments and support to farmers to foster the implementation of agricultural practices beneficial for the environment. These are the 'CAP instruments and measures addressing sustainable management of natural resources and climate action', which are:

- the cross-compliance standards of the Good Agricultural and Environmental Conditions (GAEC) and the Statutory Management Requirements (SMRs), as well as the Farm Advisory System (the horizontal measures);
- the payments for agricultural practices beneficial for the climate and the environment ('greening measures') under the direct payments (Pillar I);
- the rural development measures (Pillar II), notably those with intended effect on water resources;
- environmental measures under the operational programmes of the fruit and vegetable producers' organisations, set out in Regulation (EU) No 1308/2013 (Pillar I);
- the Programme d'Option à l'Eloignement et à l'Insularité (POSEI) for the outmost regions, as well as the Small Aegean Islands programme, even if these are not taken into account in this evaluation.

This CAP framework must integrate the EU water policy, as defined by the Water Framework Directive (WFD) adopted in 2000. The WFD required Member States to achieve 'good status for surface and groundwater' by 2015, stressing the need for actions in different policy areas, particularly agriculture<sup>1</sup>.

To assess the impact of the CAP on water, this evaluation considers the effects of the 'CAP instruments and measures addressing sustainable management of natural resources and climate action', as well as the impact of other CAP instruments and measures likely to have indirect effects on the agricultural practices implemented on farms (e.g. direct payments, sector-specific market support measures, etc.) affecting water issues.

The analysis covers the period following the implementation of the 2013 CAP reform, in particular from 1 January 2014 onwards. All EU Member States are taken into account; however, an in-depth analysis

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<sup>1</sup> Water quantity is an area of national competence and is not strongly assessed under the WFD where only groundwater quantitative status is considered. At least in parts of Europe where water scarcity is a bigger issue, this is probably not enough to actually manage water abstraction/use. However, it is also in this domain that agriculture is likely to face the biggest challenges in the future.

of the CAP implementation and effects have been carried out at the level of the River Basin Districts selected for the case studies in ten Member States. These case studies were selected to be representative of the EU as a whole, on the variety of EU geographical, hydrographical and agricultural contexts, the governance of water quantity and quality management, and the various implementation choices of the CAP measures and instruments by Member States.

## **2 IMPACT OF THE CAP ON WATER: KEY ISSUES AND DESCRIPTION OF RELEVANT MEASURES**

### **2.1 CONTEXT**

#### **2.1.1 WATER STATUS IN THE EU**

In a context of climate change and fast-growing population, sustainable water management represents a major issue for the coming years. Water is a limited resource, which is unevenly distributed in the world. In 2015, water in the EU was used mostly for agriculture, forestry and fishing (40%), for electricity, gas, steam and air conditioning supply (28%), for mining and quarrying, manufacturing and construction (18%), for households (12%), and for service industries (2%).<sup>2</sup> Then, water demand varies across the European Union and along the year. Indeed, more water is used for irrigation during the growing season. Therefore, for economic, health and sanitary reasons, it is important to protect water resources and secure their supply in terms of quantity and quality, so that current needs can be satisfied, and future ones prepared.

As part of the Water Framework Directive (see section 2.2.2), Member States are required, among other tasks, to carry out a one-year surveillance monitoring programme to provide an overview of their waterbodies' status and to identify waterbodies that may not meet the objectives defined in the River Basin Management Plan (RBMP). The results from the surveillance monitoring carried out by the Member States must nonetheless be viewed with caution, because of both improvement in the monitoring surveillance systems between the 1<sup>st</sup> and 2<sup>nd</sup> cycle and distinctive methodologies applied by Member States. Nevertheless, the data collected and reported under the WISE database make it possible to outline the global situation of water quality and quantity at EU level.

The Directive distinguishes between surface water (including rivers, lakes, transitional waters, coastal waters, artificial waterbodies, heavily modified waterbodies and territorial waters, the latter being taken into account only for the chemical status) and groundwater bodies (GWBs). The status of a surface water body is considered as 'good' when both its ecological status and its chemical status are classified as 'good' or 'high'. The status of a groundwater body is evaluated as 'good' when both its quantitative and chemical status are 'good' or better.

##### **2.1.1.1 Ecological status of surface water**

The ecological status of surface water is assessed on biological quality elements and supporting physico-chemical and hydromorphological quality elements. It is assessed by EU Member States and considers the quality of the structure and functioning of surface water ecosystems, including rivers, lakes, transitional waters and coastal waters. It shows the influence of both pollution and habitat degradation.

At the EU-28 level (except IE, EL, LT and SI<sup>3</sup>), about 57% of surface water does not achieve good ecological status<sup>4</sup>. The Member States with the highest proportion of waterbodies in high or good ecological status are mostly located in northern Europe (e.g. northern Nordic region, EE, RO, SK, UK-Scotland) or in the Mediterranean region (e.g. ES). In contrast, the river basin districts (RBD) with the highest percentage of surface waterbodies (SWBs) failing to achieve good ecological status are situated in BE, DE, LU, NL, southern SE, and the Thames RBD in the UK, where 92% of the surface water is below good status. The results are based on data reported by EU Member States and Norway. However, it should be kept in mind that each Member State develops its own RBMP methodologies, with some differences in the choice of ecological criteria and strictness in the evaluations.

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<sup>2</sup> See <https://www.eea.europa.eu/data-and-maps/indicators/use-of-freshwater-resources-2/assessment-3>

<sup>3</sup> Data not available due to late reporting of these Member States.

<sup>4</sup> According to the Member States' reporting on the 2nd RBMP.

### 2.1.1.2 Chemical status of surface waters

The chemical status of rivers, lakes, transitional waters, coastal waters and territorial waters depends on their compliance or lack thereof with the environmental quality standards (EQSs).<sup>5</sup> If all the EQSs are met (the maximal concentrations are not exceeded) for a surface water body, then the chemical status is classified as 'good'. Otherwise, the water body is considered as 'failing to achieve a good chemical status'.

At the European level, 46% of surface waterbodies are not achieving a good status. This number drops to 3% when uPBTs (ubiquitous, Persistent, Bioaccumulative and Toxic substances, e.g. mercury) are omitted. There are substantial differences between Member States and for some Member States the situation is drastically different depending on whether uPBTs are omitted or not (e.g. DE and SE). When uPBTs are omitted, the Member States the most affected by chemical pollution in surface water are BE, LU and NL. In LU, 100% of the surface waters of the RBDs have a poor chemical status.

### 2.1.1.3 Quantitative status of groundwater in the European Union

The quantitative status of groundwater bodies depends on the groundwater level regime, i.e. the level of water in the groundwater body. The quantitative status is 'good' when the long-term annual average rate of abstraction does not exceed the available groundwater resource. Otherwise, the quantitative status is 'poor'.

In the EU (except IE, EL, LT and SI<sup>6</sup>), around 9% of GWBs do not achieve a good quantitative status. Six Member States reported that all their GWBs were in good quantitative status<sup>7</sup>. However, some RBDs reported that a significant proportion of their GWBs were in poor quantitative status: notably Malta, with around 80% of its GWBs in poor quantitative status; an RBD in the centre of Spain with around 78%, the East Anglia (UK) RBD with 62% and Cyprus with 57%.

### 2.1.1.4 Chemical status of groundwater in the European Union

The chemical status of groundwater is based on two parameters: the conductivity and the concentration of pollutants. Groundwater with good status is defined as groundwater that is preserved from pollutant intrusion or saline intrusions, which could be detected by pollutant concentrations or a significant change in conductivity. The concentration of pollutants or the salinity should not exceed the EQSs. For a given groundwater body, if the mean value of the results of individual monitoring points does not confirm compliance with good chemical status, then the chemical status of the groundwater is classified as 'poor'.

At the EU level, around 25% of the groundwater bodies are of poor chemical status primarily due to nitrates and/or pesticides concentration. The RBDs with the highest percentage of groundwater bodies failing to achieve a good chemical status are located in BE, CZ, DE, ES, northern FR, IT, LU, MT, and UK. According to the European Environment Agency (EEA), the lowest groundwater quality is concentrated in areas where there is intensive agricultural production and, in some cases, heavy industry (EEA, 2018).

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<sup>5</sup> An environmental quality standard refers to the maximum allowable concentration and/or annual average concentration for a substance (European Commission, 2018). This threshold shall not be exceeded so as not to provoke disturbance of the environment. Within the scope of Directive 2008/105/EC on environmental quality standards (updated in 2013), the European Parliament has set EQSs for 33 priority substances and 8 other pollutants.

<sup>6</sup> Data not available due to late reporting of these Member States.

<sup>7</sup> LV, LU, NL, AT, RO, SI.

## 2.1.2 AGRICULTURAL PRESSURES ON WATER

The Water Framework Directive considers several groups of pressure types: diffuse sources of pollution (pollution produced by different activities, from several sources<sup>8</sup>), point sources of pollution (pollution caused by a discrete<sup>9</sup> source), abstraction (intentional removal of water from a water body), artificial recharge (intentional introduction of water into the subsurface) and hydromorphological pressure (modification of the river hydrology and physical modification to the river). These pressures result from different anthropogenic activities (called drivers), but, according to a recent report from the European Environment Agency (EEA, 2018), agriculture is the main driver for failing to achieve good status.

The following section describes how the pressures from the agricultural sector affect waterbodies. This description is based on data from the WISE database<sup>10</sup> (based on Member States reporting). When data were extracted, Greece and Lithuania had not yet reported information under the WISE database. Therefore, the analysis covers the 26 other Member States.

### 2.1.2.1 Agricultural pressures on water quality

As stated above, water quality is affected by both direct point source and diffuse pollution. Diffuse pollution, particularly from agricultural activities (in both ground and surface waters) and atmospheric deposition (EEA, 2018) followed by point source pollution from sewage treatment and industrial discharge are the principal sources of water quality deterioration<sup>11</sup>. Agricultural diffuse pollution is the cause of the bad chemical status of the SWBs in 24 Member States<sup>12</sup> and the bad ecological status of those in 20 Member States<sup>13</sup>. It is also the main driver for failure of good chemical status for EU groundwater (causing poor chemical status of 29% of GWB area).

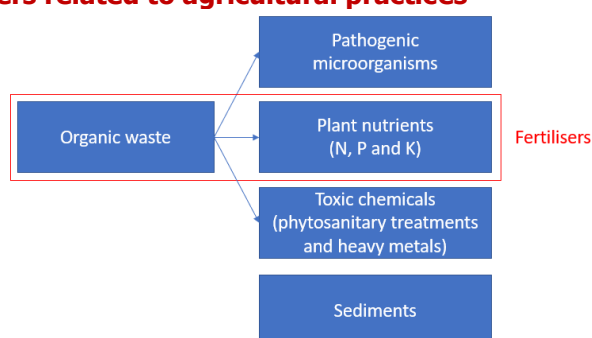
The main pollutants from agriculture include nutrients, pesticides, sediment (from soil erosion) and faecal microbes. Oxygen-consuming substances and hazardous chemicals are mainly associated with point source discharges, but this is not less linked to agriculture<sup>14</sup>. The chart below gives details on the pollutants that can come from agriculture.

**Figure 1: Categories of polluters related to agricultural practices**

Five types of water pollution due to agriculture can be identified<sup>15</sup>:

- pollution by nutrients (Nitrogen, Phosphorus and Potassium)
- pollution by organic substances
- pollution by pathogenic microorganisms
- pollution by toxic chemicals
- pollution by sediments (soil erosion).

These types of pollutions are not necessarily independent of one another, as organic waste may carry pathogenic microorganisms or contain plant nutrients or toxic chemicals (see opposite chart).



Source: Alliance Environnement, based on literature review

<sup>8</sup> Agriculture belongs mostly to this category.

<sup>9</sup> A discrete source is precisely identified geographically, such as the discharge from a sewage treatment plant.

<sup>10</sup> <https://www.eea.europa.eu/data-and-maps/dashboards/wise-wfd>

<sup>11</sup> The main significant pressures on surface water bodies are hydromorphological pressures (40 %), diffuse sources (38 %), particularly from agriculture, and atmospheric deposition (38 %), particularly of mercury, followed by point sources (18 %) and water abstraction (7 %).

<sup>12</sup> i.e. all Member States except DK and LV, in addition to EL and LT (where data are not available)

<sup>13</sup> i.e. all Member States except RO, CY, EE, SI, LV, LU, in addition to EL and LT (where data are not available)

<sup>14</sup> <https://www.eea.europa.eu/themes/water/european-waters/water-use-and-environmental-pressures/water-use-and-environmental-pressures#toc-3>

<sup>15</sup> The chart refers to pollution that enters surface and groundwater from livestock production and plant cultivation, and focus on the polluting substances, not the sources.

Only two Member States consider forestry as a significant source of diffuse pollution. In Finland, forestry activities represent a significant proportion of diffuse pollution (23%). However, it affects only 4% of the total national groundwater area (GWA) listed by Finland under its 2<sup>nd</sup> RBMP. The Member State with the largest area affected by diffuse pollution from forestry is Hungary (with 17,772 km<sup>2</sup>). However, it only represents 5% of the groundwater bodies at national level and is not the main source of diffuse pollution (only 9% of the area subject to diffuse pollution is concerned by forestry diffuse pollution).

### Nutrient pollution

Agriculture is the largest contributor of nutrient pollution to groundwater (EEA, 2018). Agricultural practices often require significant levels of fertilisers and manure, sometimes leading to high nutrient (e.g. nitrogen and phosphorus) surpluses that are transferred to waterbodies through various diffuse processes. Excessive nutrient concentrations in waterbodies cause adverse effects through eutrophication, which is characterised by an excessive growth of plants and algae in waterbodies, due to the high availability of nutrients<sup>16</sup>.

Nearly 40% of surface waterbodies in Europe are impacted by nutrient pollution; such pollution is concentrated in lowland areas. Nutrient pollution has been reported as an issue in 25 Member States out of 26 for which data are available. More than 50% of SWBs are subject to nutrient pollution in BE, DE, LU, NL and SI. However, it is in DE, FR and UK that the largest number of SWBs are affected by nutrient pollution (respectively 7,646, 3,776, and 3,144 SWBs). Nitrates are the pollutants that most commonly cause poor chemical status; they are the predominant groundwater pollutant throughout the EU (reported by 24 Member States and causing failure of 18% of the groundwater body area) (EEA, 2018).

### Organic pollution

Organic pollution is *'pollution caused (among others<sup>17</sup>), by animal or plant material derived from living and dead organisms, that may contain pathogenic bacteria and negatively influences the environment'<sup>18</sup>*. Organic pollution leads to higher rates of metabolic processes that demand oxygen. This could result in the development of water zones without oxygen (anaerobic conditions). The transformation of nitrogen to reduced forms under anaerobic conditions, in turn, leads to increased concentrations of ammonium, which is toxic to aquatic life above certain levels, depending on water temperature, salinity and pH.

At EU level, 18% of SWBs are affected by organic pollution. DK reported the highest number of SWBs affected by organic pollution (4,314, i.e. 49% of the total number of SWBs), ahead of FR (3,188, i.e. 28% of SWBs), DE (2,868, i.e. 29% of SWBs) and IT (2,212, i.e. 26% of SWBs). LU and SI identified more than 50% of SWBs as affected by organic pollution; however, these represent limited areas in absolute terms (110 SWBs and 113 SWBs, respectively).

Only seven Member States reported organic pollution as having an impact on GWBs. The most affected Member States, with the largest area involved, are ES (42,903 km<sup>2</sup> representing 12% of the total national GWA listed under the 2<sup>nd</sup> RBMP), NL (32,519 km<sup>2</sup>, i.e. 81% of the total national GWA), IT (18,817 km<sup>2</sup> representing only 7% of the total national GWA) and BE (15,579 km<sup>2</sup>, i.e. 23% of total national GWA).

### Chemical pollution<sup>19</sup>

Chemical pollution is generated by various types of substances<sup>20</sup>. The complete list is given in Annex II of Directive 2008/105/EC and Annex to Directive 76/464/EEC. EQSs for these substances are included in the Environmental Quality Standards Directive 2008/105/EC. Pesticides used in agriculture can be transferred to both surface waters and groundwater. Their concentration in waterbodies directly

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<sup>16</sup> See <https://www.eea.europa.eu/themes/water/european-waters/water-use-and-environmental-pressures/water-use-and-environmental-pressures>

<sup>17</sup> Organic pollutants originate mainly from domestic, urban run-off, industrial effluents and farm wastes.

<sup>18</sup> European Environment Information and Observation Network.

<sup>19</sup> Nitrates could also enter this category but they are treated in "nutrients" paragraph above.

<sup>20</sup> Including uPBT (ubiquitous, Persistent, Bioaccumulative and Toxic substances), pesticides, biocides, metals and other groups such as Polyaromatic Hydrocarbons (PAH), which are mainly incineration by-products and Polybrominated Biphenylethers (PBDE) that are used as flame retardants.



depends on the quantity spread per hectare. In addition to the use of pesticides in agriculture, silviculture can also make extensive use of pesticides, even if the cycles are by far less repetitive than for agriculture.

Both surface and groundwaters are affected by agri-chemicals. Pesticides represent a challenge for groundwaters across the EU, with 6.5% of GWAs not achieving good chemical status because of pesticides (EEA, 2018). Furthermore, 49% of SWBs are affected by chemical pollution, but the main substances causing failure to achieve good chemical status are uPBTs. Pesticides (Isoproturon and hexachlorocyclohexane) have also caused failure to achieve good status in several SWBs (199 and 120 respectively, out of 111,062 SWBs). Between the last two RBMP reporting periods for the WFD, there was a significant reduction in the number of waterbodies that failed to achieve good status because of these pesticides listed as priority substances<sup>21</sup> (EEA, 2018). Pesticides also affect the ecological status of surface water. On a related note, AMPA (a breakdown product of glyphosate), is the most frequently occurring pesticide-related substance (causing 185 waterbodies to fail to achieve good status).

### **Sediment pollution**

Soil erosion leads to the accretion of sediment in water systems and alters streams morphology (see following section). The excessive sediment runoff from agricultural land results in turbid waters and, in the worst cases, the clogging of spawning areas. Sedimentation is a widespread issue across the EU: it comes about when agricultural and other practices<sup>22</sup> lead to fine sediment entering rivers and lakes in far greater amounts than would occur naturally (García-Ruiz, 2010). Rain washes the fine sediment from ploughed fields and areas of bare earth. Serious overgrazing may have similar consequences. On a finer scale, cattle and other livestock can trample river banks leaving them subject to erosion, and this too is a potential source of sediment for rivers, in grassland breeding areas.

Soil erosion and sediment deposit can also modify the chemical composition of water, by increasing the level of nitrogen and phosphorous coming from soil fertilisation and soil conditioning. Chemical components from phytosanitary products may be released in surface water after soil erosion. This can result in a reduction of water oxygen levels and alter water quality.

### **Pathogenic microorganisms**

Numerous studies have revealed the presence of higher proportion of 'indicator organisms'<sup>23</sup> and pathogens in farmed watersheds compared to non-agricultural ones. These microbial pathogens generally come from animal faeces and can pose a significant risk to public and animal health. High concentrations can restrict the recreational and water supply uses of water, cause illness and loss of productivity in cattle, and limit shellfish aquaculture in estuaries<sup>24</sup>.

## **2.1.2.2 Agricultural pressures on water quantity**

Agriculture is a significant source of water abstraction for irrigation and can affect the hydromorphology of surface waterbodies (modification of the stream flow, physical modification of meanders).

### **Abstraction**

Water abstraction for agriculture has caused failure to achieve good quantitative status in 9% of the groundwater body area (EEA, 2018). Agriculture is the second main source of pressure for abstraction (the first one being public water supply), and it concerns a significant share of groundwater area in CY (56%), HU (45%), ES (33%), BE (29%), IT (12%) and MT (11%).

The water exploitation index plus (WEI+)<sup>25</sup> is used in RBDs to measure the pressure on the water resources of a certain territory as a consequence of water abstractions<sup>26</sup>. The latest data from 2015

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<sup>21</sup> Directive 2008/105/EC.

<sup>22</sup> Urbanisation, road construction, etc.

<sup>23</sup> Bacteria that indicate faecal contamination

<sup>24</sup> <https://www.eea.europa.eu/themes/water/european-waters/water-use-and-environmental-pressures/water-use-and-environmental-pressures>

<sup>25</sup> WEI+ = (Abstractions – Returns) / Renewable Water Resources.

<sup>26</sup> This index is not linked to the WFD. WEI is an independent calculation made by EEA.

indicated that water availability is a concern across large parts of the EU. Within the context of the WFD, twelve Member States have reported SWBs subject to pressure due to abstraction for agriculture (BG, CZ, DE, CY, ES, FR, HR, IT, HU, NL, PT, SE). This pressure concerns a significant share of SWBs in the Mediterranean Member States (ES, FR, IT, and CY) and in NL and BG. However, the strength of the pressure depends on climate conditions. Consequentially, the WEI+ in an RBD can increase significantly in summer (in comparison to winter) in some areas (e.g. various RBDs in ES, FR and IT). Furthermore, climate change will probably place greater demands on water supply, with increased environmental risk, across large parts of the EU (e.g. in Mediterranean and continental regions) (Laize *et al.*, 2014; Alliance Environnement, 2018; EEA, 2017; EEA, 2019).

### **Degradation of soil water retention capacity**

Soils can hold considerable amounts of water inside their pores and hold onto moisture rather than allowing it simply to obey gravity and pour through surface earth. Much of this retained water may be used by plants and other organisms, thus contributing to land productivity and soil health. Furthermore, this function of soils can mitigate the effects of extreme events such as floods and droughts. Soil's ability to effectively retain water is largely attributed to its porosity, texture, and structure. The water retention capacity of soils also largely depends on land use. Indeed, permanent grasslands or forests along watercourses prone to flood risk can mitigate this risk. Conversely soil sealing reduces the area of soil able to retain water and can lead to higher flood risk. Drainage may also have similar effects.

This pressure indirectly impacts the state of waterbodies (e.g. by regulating water flows, it can impact their quantitative states). Even though the reduction of the water retention capacity of soils is a significant driver for water abstraction (e.g. to mitigate droughts and floods risks), it is not monitored as part of the WFD.

### **Hydrological and morphological alterations**

Hydromorphological pressure results from the modification of the stream flow and the physical modification of meanders. Three types of hydromorphological pressure (among those reported within the context of the WFD) can be associated directly and indirectly to agricultural activities: physical alterations and hydrological alterations of watercourses because of agricultural activities, as well as implementation of infrastructures for irrigation (dams, barriers and locks), drainage and flood protection. In the context of climate change, the increased occurrence of extreme events (heatwaves, droughts and floods) is expected to heighten the risk of hydromorphological alteration of watercourses through heavy rainfall and landslides (EEA, 2017; EEA, 2019).

At EU level, 38% of SWBs present altered habitats due to morphological changes, while 14% have altered habitats due to hydrological changes. Among the Member States which reported hydromorphological pressures, DE, HR and HU are the most affected by hydromorphological pressure coming from agriculture. In these Member States, 54%, 41% and 31% respectively of SWBs are subject to physical alteration related to agriculture. Irrigation concerns mainly ES (15% of SWB), HU (9%) and DE (8%).

## **2.1.3 ROLE PLAYED BY AGRICULTURAL PRACTICES ON WATER-RELATED PRESSURES**

As explained in the previous sections, not only does agriculture significantly affect the chemical status of EU surface and ground waters, causing diffuse pollution by nitrates and pesticides, but water abstraction for agriculture is also one of the main significant pressures preventing groundwater bodies from achieving good quantitative status (EEA, 2018).

However, the adverse effects of agriculture on water status are not systematic; instead, they depend on the management systems implemented by farm and forest holders. Specific practices can be combined to exert positive or negative impact on water.

For this evaluation, the analysis looks at the theoretical effects on water of different types of farming practices. Therefore, the term 'farming practices' is used here as a generic one to designate the strategic decisions taken by farmers that affect land occupation, such as the introduction of ecological features or specific types of areas (e.g. nitrogen-fixing crops or permanent grasslands), as well as decisions taken concerning crop/plot management or livestock management.

## **Role played by farming practices on water quality**

Practices affecting water quality can be separated into (i) practices concerning crop systems and land occupation and (ii) practices concerning crop and livestock management (see figure next page).

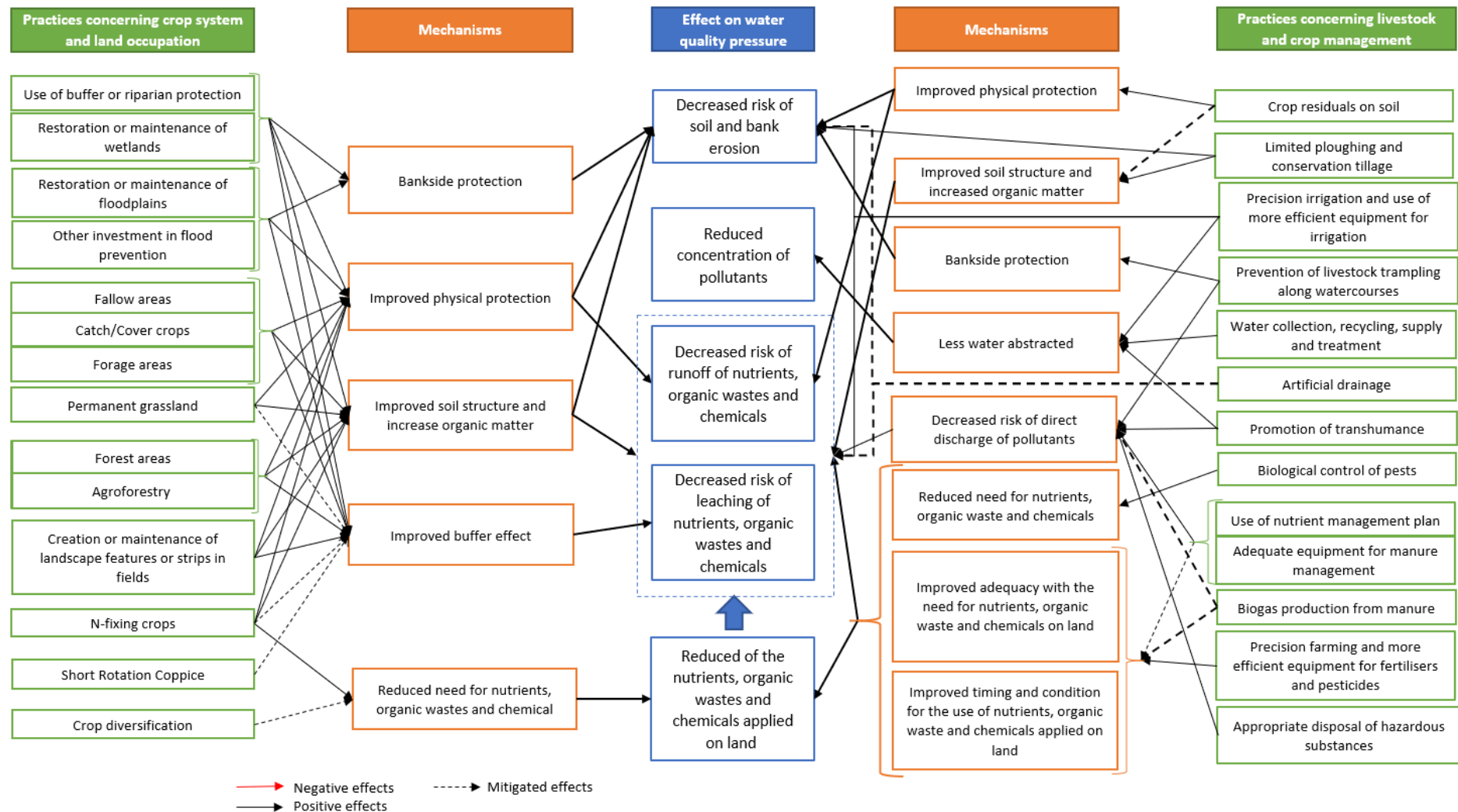
Globally, land occupation and vegetation covers can affect physical and biological protection of water both above and below the soil surface. Firstly, soil coverage and landscape features can act as a physical barrier. They also protect the soil both from erosion, by limiting sun and wind exposure, and from water runoff, by slowing or absorbing surface water. Many practices impacting root systems and organic matter can affect soil structure and biological activity. It has been shown that improved soil stability aids in better resisting erosion and has a positive effect on pollutant losses through runoff or leaching, by immobilising them in the upper layers of soil. Vegetative elements can also act as a buffer in soil, catching nutrients, chemicals and sediment thanks to their large roots systems. This mechanism can be especially important when the vegetative elements are grown along contours of sloping fields or watercourses. When located on banksides, they also help protect these latter against erosion, thereby limiting pollution by sediments.

In order to limit the quantity of nutrients, organic waste and chemicals applied on land and their transfer into waters via runoff and leaching, crop management practices on farms can be implemented to minimise the level of inputs needed on the plot (e.g. by using nitrogen-fixing crops), adapt the quantity of inputs applied to meet to the plot's requirements (e.g. by using precision farming) or optimise the conditions and timing of applications. Furthermore, investment in better water management equipment can make it possible to decrease water abstraction and thus to limit the concentration of pollution in waterbodies.

Livestock activity can be a heavy source of pollution of waterbodies in the event of poor management of effluents and if animals have direct access to waterbodies. It can also be a source of hydromorphological alteration. Good management practices, particularly along watercourses, can avoid the direct discharge of faeces in water and also prevent bankside erosion (e.g. fences along watercourses). Other good management practices in this respect are to limit overgrazing, promote transhumance, and limit water abstraction for livestock and forage production.

The chart on the next page shows the ways in which practices concerning both crop systems and land occupation on the one hand and livestock and crop management on the other can affect water quality.

**Figure 2: Mechanisms implied between agricultural practices and effects on water-related qualitative pressures**



## Role played by farming practices and land use on water quantity

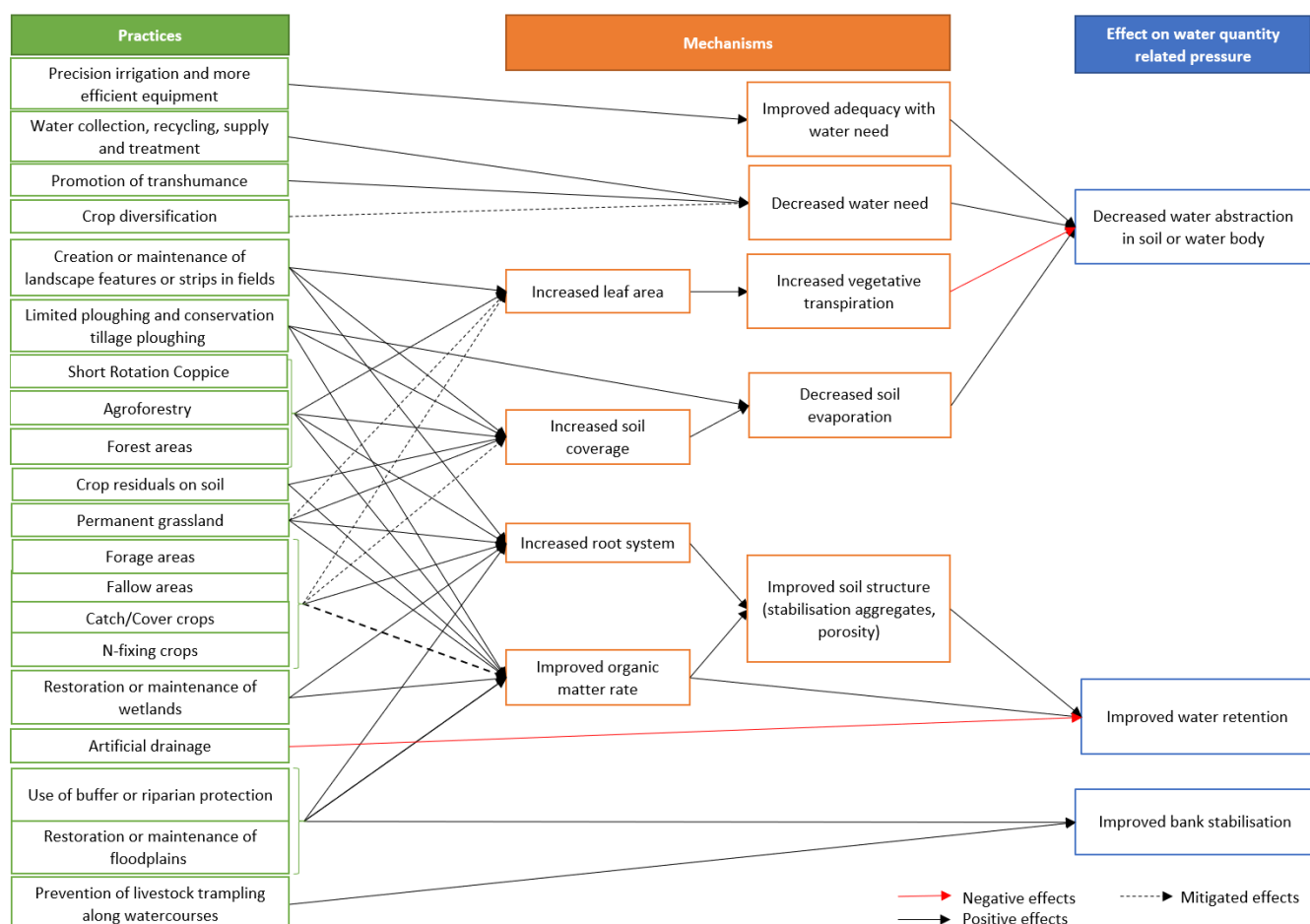
Practices that impact water quantity chiefly affect the soil-plants systems, through their effect on evapotranspiration and soil structure.

Firstly, plant cover (e.g. crops, cover crops, forest, etc.) and some crop management practices (e.g. leaving crop residuals on soil) can limit soil evaporation, especially by protecting soil from wind and sun. At the same time, living vegetation also uses some of the water stored in soil for its own needs and transpiration. Therefore, the net effect of practices impacting evapotranspiration (the net balance between both reduced evaporation and increased transpiration) is highly variable and significantly depends on climate. This phenomenon is particularly critical in areas of water scarcity.

Secondly, many practices can affect the root system and organic content of soil: these are both important parameters determining soil structure and its water retention capacity. Indeed, the stabilisation of soil structure enhances porosity, which improves infiltration and soil water retention capacity. This retention capacity can also be directly affected by some practices such as drainage or floodplain restoration.

Thirdly, some practices can directly impact the quantity of water abstracted for irrigation (e.g. the choice of crop grown and the use of precision agriculture or of water recycling technologies). Finally, the morphology of watercourses can be impacted by agricultural practices affecting bank stabilisation, such as buffer strips, riparian margin or floodplain protection<sup>27</sup>. These practices, the mechanisms and the type of pressure are synthesised in the chart below.

**Figure 3: Mechanisms implied between agricultural practices and effects on water-related quantitative pressures**



<sup>27</sup> Watercourse morphology and water quantity issues are interlinked; therefore, pressures related to watercourse morphology have been included in water quantity aspects.

## Synthesis of agricultural practices impacting water-related pressures

The main results of the literature review are summarised in this section. Practices identified as having an impact on water-related pressures are presented in the table below, together with the pressures concerned (the acronyms used are explained in the legend below the table).

**Table 1: Agricultural practices identified as having an impact on water-related pressures and pressures concerned**

Category	Practices	Pressure on water quality	Pressure on water quantity
<b>Land occupation</b>	Forest area	SE, RO, LL	WR, WA
	Agroforestry area	SE, RO, LL	WR, WA
	Nitrogen-fixing crops area	SE, RO, LL, NFC	WR, WA
	Short rotation coppice area	LL	WR, WA
	Permanent grassland area	SE, RO, LL	WR, WA
	Fallow area	SE, RO, LL	WR, WA
	Forage crop area	SE, RO, LL	WR, WA
	Maintenance/creation of landscape features such as trees, hedges, field boundaries or terraces	SE, RO, LL	WR, WA
	Diversification	NFC	
<b>Crop/plot management</b>	Maintenance/creation of buffer strips	SE, RO, LL	WR, WA, BS
	Maintenance/creation of strips on fields	RO, LL	WR, WA
	Use of cover/catch crops	SE, RO, LL	WR, WA
	Conservation or soil incorporation of crop residuals	SE, RO	WR, WA
	Minimal soil cultivation (no-till or reduced tillage): Conservation tillage	SE, LL	WR, WA
	Use of machinery limiting soil compaction		WR
	Maintenance/creation of wetlands	SE, RO, LL	WR, WA
	Maintenance/creation of floodplain	RO, LL	WR, WA, BS
	Riparian/bank protection	SE, RO, LL	WR, WA, BS
	Use of artificial drainage	SE, RO, LL, CP	WA
	Use of biological control of pests (using more resistant variety, natural enemy species, etc.)	NFC, LL	
	Use of nutrient management plan	LL, NFC	
	Non-ploughing on slopes or under certain climatic conditions	SE	WR, WA
	Appropriate disposal of hazardous substances	NFC, RO, LL	
	Prevention of livestock overgrazing	LL, SE	
<b>Livestock management</b>	Promotion of transhumance		WA
	Prevention of livestock trampling along watercourses	SE, LL	BS
	Investments for water collection, recycling supply and treatment	CP	WA
<b>Investment and use of new equipment</b>	Investments in flood prevention	LL, RO	
	Use of precision irrigation and/or more efficient equipment for irrigation	SE, RO, NFC, CP	WA
	Use of precision farming and/or more efficient equipment for fertilisers and pesticides	NFC, RO, LL	
	Use of adequate equipment for manure management and storage	LL, NFC	

Pressures concerned: reduction of nutrients, organic wastes and chemicals applied on land (NFC); bank stabilisation (BS); reduction of risk of runoff of nutrients, organic wastes and chemicals reaching water sources (RO); protection against soil and bank erosion (SE); prevention of losses by leaching of nutrients, organic wastes and chemicals into groundwater (LL); reduction of water abstraction (WA); improved water retention capacity of soil (WR); reduction of concentration of pollutants in groundwater (CP).

The legend used in the table above is the following.

XXX Positive effect

XXX Negative effect

XXX Effect variable depending on implementation choice or soil and climate conditions

Source: Alliance Environnement compilation based on literature review

## 2.2 DESCRIPTION OF THE REGULATORY FRAMEWORK

The EU water policy is framed by the Water Framework Directive (WFD) (Directive 2000/60/EC). It provides a European regulatory framework for national water policies and complete various other



regulations<sup>28</sup> that may influence the impact of agricultural activities on water. It sets up an objective of good ecological and chemical water status (see Article 1 of that Directive).

Besides this overall framework, the Common Agricultural Policy (CAP) provides a set of regulatory and financial instruments to the agricultural sector, addressing the sustainable management of water resources, or having an effect on it. Among them, the binding standards defined in cross-sectoral regulations related to water, described in sections 2.2.2 and 2.2.3, are reflected in the CAP by the Statutory Management Requirements (SMRs).

The next chapters describe the CAP measures having a direct or indirect relationship with water management, as well as the main provisions of the EU water policy, which also concern the agricultural sector.

## **2.2.1 THE CAP INSTRUMENTS AND MEASURES LINKED TO WATER**

The 2014-2020 CAP framework is implemented by four main regulations (basic acts):

- horizontal measures on the financing, management and monitoring of the CAP – Regulation (EU) No 1306/2013;
- for Pillar I:
  - direct payments to farmers – Regulation (EU) No 1307/2013;
  - the single Common Market Organisation (CMO) – Regulation (EU) No 1308/2013;
- for Pillar II: Support for Rural Development - Regulation (EU) No 1305/2013.

The two pillars of the CAP are financed from two dedicated funds, the European Agricultural Guarantee Fund (EAGF) for Pillar I and the European Agricultural Fund for Rural Development (EAFRD)<sup>29</sup> for Pillar II. Since the adoption of the basic acts, some further amendments have been introduced. They are of interest for the analysis, but their effects are not yet evaluable:

- Commission Delegated Regulation (EU) 2017/1155, amending Delegated Regulation (EU) No 639/2014, included amendments concerning the greening measures, following the review of their implementation after the first year of application<sup>30</sup>.
- The 'Omnibus' Regulation (EU) 2017/2393 of 13 December 2017, which provides several changes in the implementation of the current CAP, for the first and second pillars, aiming to simplify the implementation of the policy. Among others, simplifications on greening measures and conditions related to the implementation of Pillar II measures are included in the analysis.

### **2.2.1.1 Water-related CAP instruments and measures**

Overall, the CAP contributes to three general objectives, which together feed into the Europe 2020 objectives of smart, sustainable and inclusive growth. Sustainable management of natural resources and climate action is one of these general objectives (the two other objectives being viable food production and balanced territorial development).

In the 2014-2020 CAP framework, three main cross-sectoral instruments have been designed specifically to have an influence on water-related agricultural practices:

- some of the regulatory provisions contained in cross-compliance rules, as defined in Regulation (EU) No 1306/2013, known as the 'horizontal regulation';
- Some regulatory provisions under greening measures which as such do not directly target water but which promote actions and practices beneficial to the environment and the climate thus indirectly water and is defined under Pillar I (Regulation (EU) No 1307/2013);
- and some measures set out in Regulation (EU) No 1305/2013, known as the 'Rural Development Regulation' (RDR).

In addition, the Fruit and Vegetables aid scheme of the CMO regulation also has an objective related to water management.

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<sup>28</sup> Regulations on floods, Environmental Quality Standards, the Ground Water Directive, etc.

<sup>29</sup> One of the European Structural and Investment (ESI) funds, for Pillar II.

<sup>30</sup> It came into force on 30 June 2017.

However, several other CAP instruments, in particular those defined in Pillar I, may indirectly have an impact on water aspects, depending on the significance of their scope (budget, number of beneficiaries). These measures and their potential are identified in ESQ 7.

### 2.2.1.2 Horizontal regulation

Regulation (EU) No 1306/2013 defines the CAP objectives, the control requirements, the rules for provision by each Member State of full transparency regarding all beneficiaries and the monitoring and evaluation framework. Moreover, it defines the crisis reserve, the cross-compliance system and the Farm Advisory Service, the two latter playing a significant role in the implementation of agricultural practices beneficial for the water resources.

#### The CAP cross-compliance

First introduced in 2003, cross-compliance comprises a set of basic rules to meet public expectations on the environment, public and animal health and animal welfare, which farmers have to obey. Cross-compliance covers two main categories of standards:

- **Statutory management requirements (SMRs):** these requirements refer to certain provisions of 13 legislative standards (including regulations and directives) that exist independently of the CAP and apply to all farmers (even those not receiving EU support). The standards related to water issues stem from the Nitrates Directive and other regulations that may have an influence on the impact of agricultural activities on water, presented in sections 2.2.2 and 2.2.3;
- Standards of **Good Agricultural and Environmental Condition (GAEC):** all agricultural land for farmers claiming payment should be kept in Good Agricultural and Environmental Condition (GAEC). In the period 2014-2020 three GAECs (GAEC 1, GAEC 2 and GAEC 3 directly target water). The general requirements are set out in Regulation (EU) No 1306/2013, and Member States are required to define, at national or regional level, minimum standards for beneficiaries to maintain agricultural land in good agricultural and environmental condition. These may differ, depending on local conditions. The different choices made by the Member States are detailed in ESQ 1.

Under the resulting cross-compliance system, farmers who do not comply may be penalised by a reduction in or exclusion of the support received under the CAP. The following table presents the GAEC and SMR standards relevant to water issues, covering those designed to address water issues and others not targeted to water but also affecting it; the legislation for the period 2014-2020 specifies that SMR1, GAEC 1, GAEC 2 and GAEC 3 are targeted to water issue.

**Table 2: Cross-compliance standards considered in the evaluation**

	2007-2013	2014-2020	Nutrient pollution	Chemical pollution	Water quantity
Establishment of buffer strips along watercourses	GAEC 5.1	GAEC 1	X	X	
Where use of water for irrigation is subject to authorisation, compliance with authorisation procedures	GAEC 5.2	GAEC 2			X
Protection of groundwater against pollution caused by certain dangerous substances	SMR 2	GAEC 3	X	X	
Minimum land management reflecting site specific conditions to limit erosion	GAEC 1.2	GAEC 5	X	X	
Maintenance of soil organic matter	GAEC 2.2	GAEC 6	X	X	
Retention of landscape features	GAEC 4.3	GAEC 7	X	X	
Protection of waters against pollution caused by nitrates	SMR 4	SMR 1	X		
Placing of plant protection products on the market	SMR 9	SMR 10		X	

Source: Alliance Environnement

Between the programming periods of 2007-2013 and 2014-2020, as regards water-related standards, some changes were made in the numbering of the standards (e.g. GAEC 5.1 became GAEC 1), in the classification as GAEC or SMR (e.g. SMR 2 became GAEC 3) and in the grouping of the standards within specific themes (i.e. a specific theme was created on water to group together GAEC 1, 2 and 3 and SMR 1). However, the content of the standards remained quite constant between the two periods. On SMR



10 (ex-SMR 9), the Regulation has been updated and SMR 10 is now related to Regulation (EC) No 1107/2009, which repeals Directive 91/414/EEC.

## Farm Advisory System

Member States must set up a Farm Advisory System (FAS), dedicated to helping farmers to better understand and meet certain EU rules. This includes not only those covered by cross-compliance in particular, but also (since 2014) the Pillar I green payments, the conditions for the maintenance of land eligible for direct payments, the Water Framework Directive, the Sustainable Use of Pesticides Directive, as well as certain Rural Development measures (measures contributing to farm modernisation, enhancing competitiveness, innovation and market orientation, etc.). Moreover, as defined in Annex I of Regulation (EU) No 1306/2013, the FAS may also cover issues related to climate change and adaptation, biodiversity and protection of water, by providing the following, in particular:

- information on sustainable, low-volume irrigation systems and how to optimise rain-fed systems, in order to promote efficient water use;
- information on reducing water use in agriculture, including crop choice; on improving soil humus to increase water retention; and on reducing the need to irrigate.

The FAS can be operated by public or selected private bodies.

## 2.2.1.3 Pillar II

### Overall architecture

Regulation (EU) No 1305/2013 sets three overarching strategic objectives for the EU Rural Development policy, contributing to the Europe 2020 Strategy and the overall CAP objectives:

- fostering agricultural competitiveness;
- **ensuring sustainable management of natural resources and climate action; and**
- achieving balanced territorial development of rural economies and communities, including the creation and maintenance of employment.

These broad objectives manifest themselves in six EU Priorities for rural development, which are coherent with the thematic objectives of the other ESI funds. These priorities are in turn translated into 18 Focus Areas (FA). Moreover, they must contribute to the crosscutting objectives of innovation, environment and climate change mitigation and adaptation. The issues of water preservation and the enhancement of water management are addressed through two FA: FA 4B 'improving water management, including fertiliser and pesticide management' and 5A 'increasing efficiency in water use by agriculture' (see Table 3). FA 5D and 5E also contribute to address water issues, by increasing the organic matter content in soil. Furthermore, the quantified targets of the 2014-2020 Rural Development Programmes (RDPs) indicate that 15% of agricultural and 4.3% of forestry land in the EU should be under contracts to improve water management.

In order to allocate some budget to FA 5A, Member States must fulfil the ex-ante conditionality on the water sector (Annex V of the RDR). It requires the existence of a pricing policy and ensures that the different water uses contribute to the recovery of the costs of water services adequately, taking into account social, environmental and economic effects, as well as geographic and climatic conditions. However, the ex-ante conditionality on water applies only to expenditures and measures programmed under FA 5A (mostly investments for the modernisation of existing irrigation equipment and infrastructure). Investments programmed under Focus Area 2A (investments to expand the irrigated area/new irrigation) are not subject to this ex-ante conditionality.

**Table 3: Priorities and Focus Areas addressing water issues in the RDP**

Priority	Focus Area
<b>Priority 4:</b> Restoring, preserving and enhancing <b>ecosystems</b> related to agriculture and forestry:	<p>(a) restoring, preserving and enhancing biodiversity (including in Natura 2000 areas and in areas facing natural or other specific constraints) and high nature-value farming, as well as the state of European landscapes;</p> <p><b>(b) improving water management, including fertiliser and pesticide management;</b></p> <p>(c) preventing soil erosion and improving soil management.</p>

Priority	Focus Area
<b>Priority 5:</b> promoting <b>resource efficiency</b> and supporting the shift towards a low-carbon and climate resilient economy in agriculture, food and forestry sectors, with a focus on the following areas:	<b>(a) increasing efficiency in water use by agriculture;</b> (b) increasing efficiency in energy use in agriculture and food processing; (c) facilitating the supply and use of renewable sources of energy, of by-products, wastes, residues and other non-food raw material, for purposes of the bio-economy; <b>(d) reducing nitrous oxide and methane emissions from agriculture;</b> <b>(e) fostering carbon sequestration in agriculture and forestry.</b>

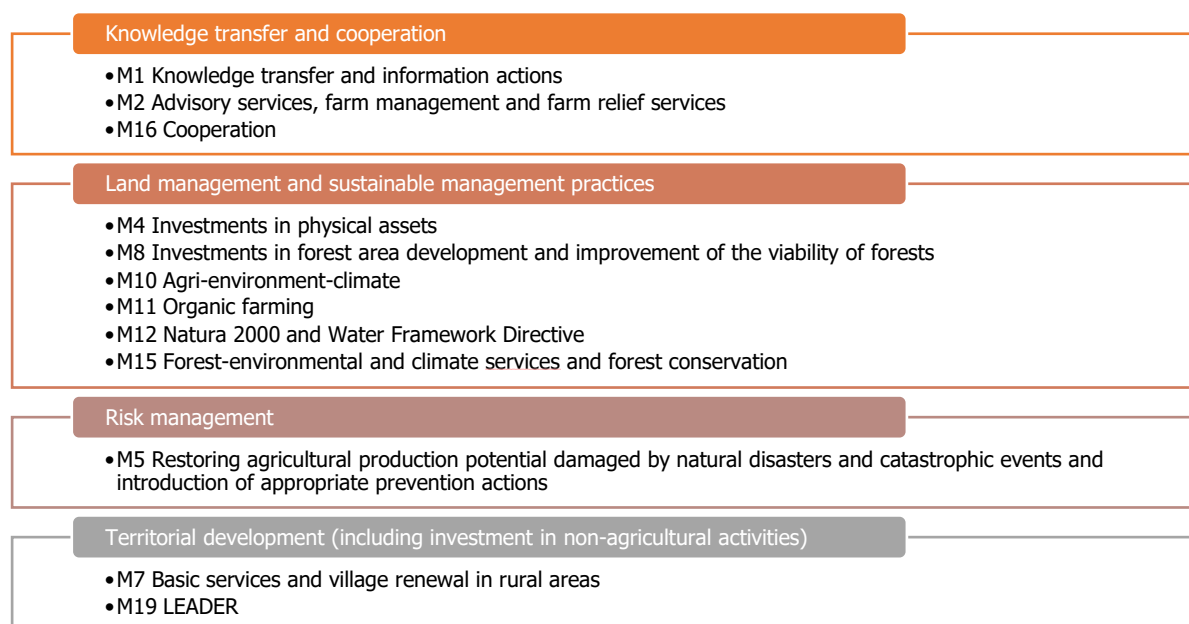
Source: Regulation (EU) No 1305/2013

Support for rural development policy is co-financed by the EAFRD and national or regional budgets. Additional resources (national, regional, private, etc.) are allowed (and required for certain measures). These Priorities and Focus Areas are taken into account in the EAFRD and translated into a suite of 19 measures and 64 sub-measures to be selected by Managing Authorities according to their strategic programming approach. Only two of them are compulsory – the agri-environment-climate measure and implementation of the Leader approach. The choice of measures is defined in Rural Development Programmes (RDPs), designed by Management Authorities at either the national or regional level in a Member State. National or regional needs are identified through SWOT analysis among other means, carried out at the start of the programming process.

### Scope and contents of the Rural Development measures contributing to water issues

Measures and sub-measures that are most likely to have significant effects on water issues are presented in the figure below. The Rural Development Regulation defines M8, M10, M11, M12, M15 as of particular relevance for Priorities 4 and 5 and their related Focus Areas. But other measures might also have effects on water quality or quantity.

**Figure 4: List of the main measures of EAFRD with the potential to impact the objective 'sustainable management of natural resources and climate action'**



Source: Alliance Environnement, based on Regulation (EU) No 1305/2013

With regard to the sub-measure M4.1 for investments in agricultural holdings, Article 46 of Regulation (EU) No 1305/2013 provides specific conditions for investments related to irrigation and refers to the WFD provisions (see the box below).

### Box 1: Provisions under Article 46 of Regulation (EU) No 1305/2013

Article 46 of Regulation (EU) No 1305/2013 requires consistency to the WFD and requires that all irrigation investments supported under the measure should be consistent with the River Basin Management Plan (RBMP). It is an example of cross-compliance between the WFD and the RDP.

Therefore, a series of provisions are required for the investment to be eligible:

- The entire area in which the investment takes place shall be covered by an RBMP; this stands for any other area affected by the investment.
- Water metering devices should be installed in the supported farms.

Eligibility criteria for investments to **improve an existing irrigation system**:

- a. If waterbodies concerned by the investment have good quantitative status: the ex-ante assessment must show that the investment will lead to a minimum of 5 to 25% potential water savings.
- b. If waterbodies concerned by the investment have less than good quantitative status: the investment shall ensure an effective reduction in water use of at least 50% of the potential savings (i.e. 50% of the 5 to 25%).

The eligibility criteria listed above do not apply in the cases of an investment in an existing installation which affects only energy efficiency, an investment in the creation of a reservoir, or an investment in the use of recycled water which does not affect a body of ground or surface water.

Eligibility criteria for investments resulting in a net **increase of the irrigated area** affecting a given body of ground or surface water:

- a. The quantitative status of the concerned water body must not be less than good.
- b. The ex-ante environmental analysis must show no significant negative environmental impact from the investment.

Derogations to point a. above apply, making the expansion of the irrigated area eligible in areas where the quantitative status of waterbodies concerned are less than good, under the following conditions:

- The expansion is combined with an investment in an existing irrigation system assessed ex ante as offering potential water savings of a minimum of between 5% and 25%, according to the technical parameters of the existing installation or infrastructure.
- The investment ensures an effective reduction in water use, at the level of the investment as a whole, amounting to at least 50% of the potential water savings, made possible by the investment in the existing irrigation system.

Derogation to point a. also applies to investments in the establishment of a new irrigation installation supplied with water from an existing reservoir approved by the competent authorities before 31 October 2013.

#### 2.2.1.4 Pillar I

##### Direct payments

Since 2003, direct payments – i.e. area-related payment based on the number of hectares of farmed land and/or coupled payments based on fixed areas, type of crops grown, and yield and/or numbers of animals – have been paid to farmers to support income. The amount paid per hectare may differ depending on the Member State, region and farm, but by 2019 entitlement values should converge completely or at least result in no farmer receiving less than 60% of the relevant national or regional per hectare average rate. In the Member States which chose to offer it, the Small Farmer Scheme (SFS) payment replaces all direct payments by an annual flat-rate support.

In addition to the basic payment for farmers, voluntary coupled support (VCS) can be provided to sectors facing particular situations where specific types of farming or specific agricultural sectors are particularly important for economic, environmental or social reasons. The most supported sectors include: beef and veal, dairy products, sheep and goat meat, and protein crops.

A significant change made with the 2013 CAP reform has been the introduction of greening payments to support climate and environment-friendly agricultural practices that go beyond cross-compliance, for which Member States are required to use 30% of their direct payments budget. The three greening obligations are: (i) crop diversification aiming among others to protect soil quality, (ii) maintenance of permanent grassland targeting in particular carbon sequestration and (iii) Ecological Focus Areas (EFA) aiming principally to improve biodiversity (see table below for the description of the measures). Practices apply on the whole eligible area of the holding, except permanent crops. Farmers who do not comply with greening rules will receive reduced payments. Member States may choose to develop and offer

'equivalent' practices<sup>31</sup> (to any of the three greening measures), but they have to yield at least equivalent climate and environment benefits to the standard greening measures. Farmers entering the SFS are exempted from greening obligations (and from cross-compliance requirements).

**Table 4: Budgetary rules related to direct payments for 2014-2020 and their main conditions**

Mandatory direct payments	% of DP envelope	Voluntary direct payments	% of DP envelope
<b>Basic payment</b>	Ranges between 12.4% and 68% in MS	<b>Payments for areas with natural constraints</b>	Up to 5%
		<b>Redistributive payment</b>	Up to 30%
<b>Green payment</b>	30% fixed	<b>Coupled support</b>	Up to 8% or 13%, +2% for protein crops
<b>Young Farmers Scheme</b>	Up to 2%	<b>Small Farmers Scheme</b>	Up to 10%

Source: Alliance Environnement, based on Regulation (EU) No 1307/2013

Member States are allowed to transfer up to 15% of their direct payment envelope (Pillar 1) to Rural Development Programmes (Pillar II) and vice versa. Member States where the average direct payment per hectare remains below 90% of the EU average may transfer a higher share (up to 25%) of their Rural Development envelope to direct payments.

**Table 5: Description of the greening measures**

Measure	General rules
<b>Crop diversification</b>	Crop diversification targets in particular the improvement of soil quality. The requirements apply only to farms with arable land exceeding 10 ha. Farmers with arable areas between 10 ha and 30 ha must cultivate at least two different crops, and the main crop cannot exceed 75% of the arable land. Where the arable area is above 30 ha, at least three different crops must be grown: the main crop cannot exceed 75% of the arable area, and two main crops 95% of the latter.
<b>Maintenance of permanent grassland</b>	There are two main requirements on the maintenance of permanent grassland: (i) The ratio of permanent grassland compared to the total agricultural area claimed must not decrease by more than 5% relative to the reference level established in 2015. The maintenance of this ratio can be monitored at national, regional or farm level, as decided by each Member State. In the event that it drops by more than 5%, farmers have reconversion obligations. This requirement targets in particular carbon sequestration. (ii) Member States shall designate permanent grasslands deemed as environmentally sensitive (ESPGs) within Natura 2000 sites (e.g. on peatlands and wetlands), and may optionally do so outside, including permanent grasslands on carbon-rich soils. Farmers must not convert or plough these designated ESGPs. The requirement targets in particular carbon sequestration, biodiversity and soil protection.  The 2013 reform broadened the definition of permanent grassland compared to the 2007-2013 period by allowing the inclusion of shrubs and/or trees <sup>32</sup> and land where non-herbaceous forage predominates and where traditional grazing practices are used. The modification of the legislation in 2017 ('Omnibus' Regulation) <sup>33</sup> also introduced the ploughing-up criterion to qualify as permanent grassland the grassland that has not been ploughed up in the preceding five years.
<b>Ecological Focus Areas (EFAs)</b>	Ecological Focus Areas (EFAs) require farms with arable land above 15 ha to allocate 5% of the arable land to EFAs that can comprise fallow (no production), terraces, landscape features, buffer strips, agroforestry, afforested areas (with RDP support), forest edges (with or without production), short rotation coppice, catch crops, green cover and nitrogen-fixing crops. The modification of the legislation in 2017 ('Omnibus' Regulation) <sup>34</sup> introduced additional EFAs (land lying fallow for melliferous plants, <i>Miscanthus</i> and <i>Silphium Perfolium</i> ). These elements are subject to different weighting based on their relative duration and environmental value. Catch crops, N-fixing crops and land lying fallows are the most popular EFA measures among farmers: together their rate of uptake exceeds 95% of total EFA areas. EFA obligations aims at safeguarding and protecting the biodiversity on farms but several provisions for catch crops, N-fixing crops and buffer strips cover specifically also water aspects.

Source: Alliance Environnement, based on Regulation (EU) No 1307/2013

## Common Market Organisation

Regulation (EU) No 1308/2013 establishing a common organisation of the markets in agricultural products (CMO) repeals Regulation (EC) No 1234/2007, which had previously grouped together the regulations concerning most of the agricultural sectors, updated after the Health Check in 2009. It defines the legal framework that regulates the internal market, trade with non-EU Member States,

<sup>31</sup> Eight Member States decided to apply equivalence to one or more greening measures in 2018.

<sup>32</sup> As long as grasses and other herbaceous forage remain predominant and trees and shrubs are actually used for grazing.

<sup>33</sup> Regulation (EU) 2017/2393 amending Regulation (EU) No 1307/2013

<sup>34</sup> Idem

competition rules and the rules on State aid. It also contains general provisions on exceptional measures and the new reserve fund for crises in the agriculture sector.

Environmental issues are addressed in the CMO regulation by some of the measures contained in sectoral aid schemes. Water is explicitly mentioned as an objective only for the programmes in the fruit and vegetable sector. These schemes were already in place before the 2013 CAP reform and did not incur any major change.

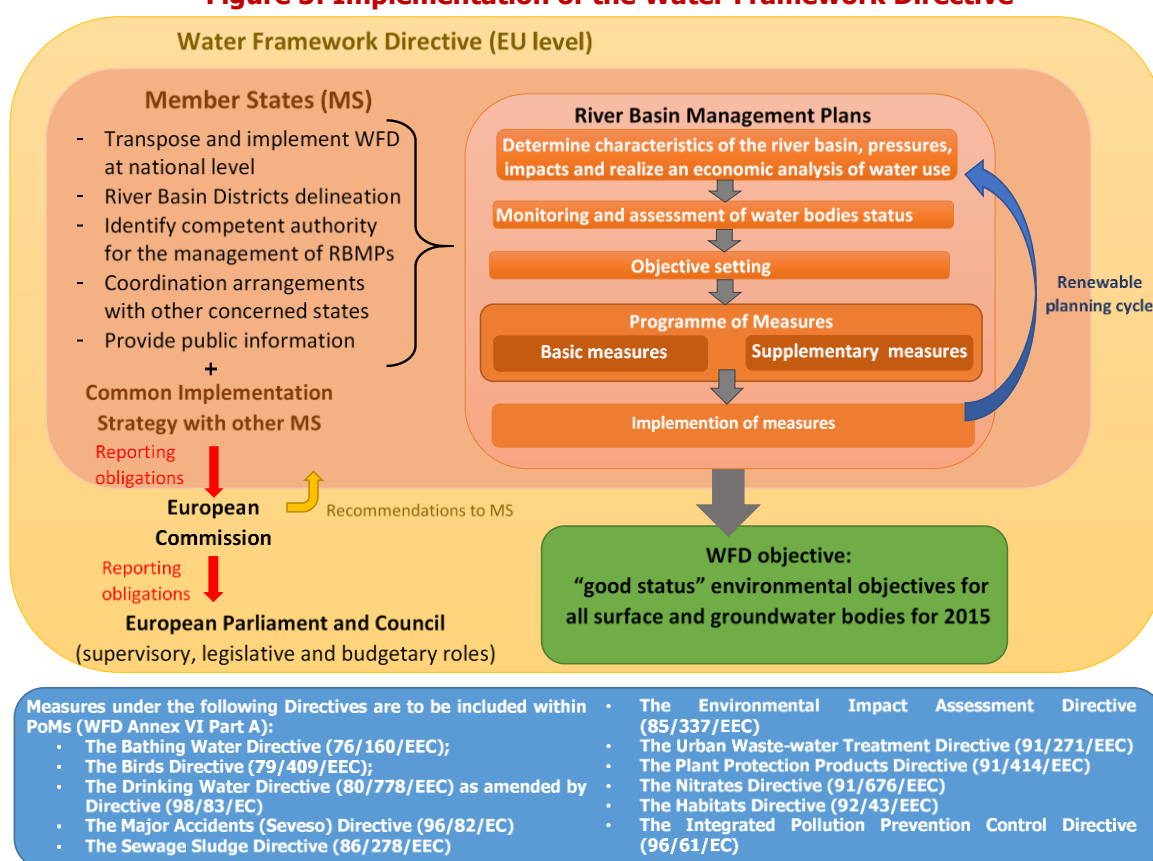
## 2.2.2 THE WATER FRAMEWORK DIRECTIVE

### 2.2.2.1 General presentation

The Water Framework Directive (WFD) 2000/60/EC was adopted on 23 October 2000. It provides a European regulatory framework for national water policies, managed through River Basin Management Plans (RBMPs) and Programme of Measures (PoMs). The aim of the WFD was to prevent deterioration in the status of waters and to achieve 'good status' for environmental objectives for all surface and groundwater bodies by 2015. Member States were required to establish monitoring networks by 2006 and complete RBMPs and PoMs by 2009.

According to the Directive, RBMPs and PoMs are to be updated every six years. Therefore, this planning process constitutes a six-year cycle that can be started over again and improved. The implementation and the planning process of the Directive are presented in the following figure.

**Figure 5: Implementation of the Water Framework Directive**



Source: Alliance Environnement

### **2.2.2.2 The River Basin Management Plans (RBMPs) and Programme of Measures (PoMs)**

#### **Governance**

Member States are responsible for the national implementation of the WFD. They need to ensure appropriate administrative arrangements and identify the competent authorities for each river basin, and to provide the Commission with a list of those authorities. The Directive points out the importance of involving all stakeholders in the implementation process, especially in the establishment and updating of the RBMPs.

As mentioned in Article 13 of the WFD, Member States have to identify the individual river basins and produce one River Basin Management Plan (RBMP) per river basin district lying entirely within their territory (or in coordination with neighbouring countries for international RBMPs). Annex VII of the WFD defines the aspects to be covered by the RBMPs, such as characteristics of the river basin, pressures and impacts (including agricultural ones), mapping of the area and of the monitoring network, a summary of the PoMs, the list of competent authorities, etc.

#### **The Programme of Measures (PoMs)**

PoMs are action plans containing measures aimed at achieving the WFD objectives. Measures are defined by Article 11 of the WFD and divided into basic measures and supplementary measures. Basic measures include:

- measures to implement European legislation oriented towards water protection<sup>35</sup>;
- recovery of costs for water services (e.g. water pricing policies);
- measures to promote efficient and sustainable water use which is compliant with environmental objectives;
- measures to meet the requirements on drinking-water abstraction;
- verifications, permits, registration, authorisations or prohibitions (e.g. on water abstraction);
- measures to eliminate pollution of surface waters by those substances on the list of priority substances;
- measures required to prevent significant losses of pollutants from technical facilities, and to prevent and/or reduce the impact of accidental pollution incidents.

Supplementary measures may include legislative instruments, administrative instruments, emission controls, codes of good practices, abstraction controls, recreation and restoration of wetland areas, educational projects, etc. (see Water Framework Directive, Annex VI Part B).

Basic measures are mandatory; supplementary measures are optional but can be required where basic measures are not sufficient enough to achieve the environment goals.

### **2.2.2.3 Implementation and financing**

RBMPs were supposed to be finalised by 2009. Delays in the planned timetable for their adoption were observed. Half of the Member States concerned (i.e. EU 27 and Norway) managed to get their RBMPs adopted by March 2010, and only nine managed to get their RBMPs adopted before the end of 2009<sup>36</sup>. At the date of the Commission report in 2012, four Member States had still not (or had partially) adopted their RBMPs. In 2017, the second cycle of RBMPs were adopted by almost all Member States, apart from Austria, Greece, Ireland and Lithuania, and partial adoption in the case of Spain (still pending for Canary Islands)<sup>37</sup>.

No specific source of funding was provided in the WFD for the implementation of PoMs. The 2015 Commission report on the progress in implementing the WFD PoMs identified sources of funding for

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<sup>35</sup> i.e. protection of water as set out in Annex I of Regulation (EU) No 1306/2013.

<sup>36</sup> European Commission (2012) - CSWD on the Implementation of Water Framework Directive (2000/60/EC) River Basin Management Plans.

<sup>37</sup> Update on RBMP and FRMP adoption and reporting – Assessment of RBMP and FRMP – SCG meeting – 17 May 2017 – Thomas Petitguyot – DG ENV Clean Water Unit.



both types of measures, basic and supplementary. Most measures (81%) turned out to be financed by non-EU funds, whereas 5% of PoM financing originates from the EAFRD. Other sources of funding are national budgets or private funds (EC, 2015); the Polluter Pays principle and the Beneficiary Pays principle, using water-pricing policies; and the European Investment Bank (EC, 2017).

## **2.2.3 OTHER DIRECTIVES**

### **2.2.3.1 Nitrates Directive**

The Nitrates Directive (91/676/EC) aims to protect water against agricultural pressures by specifically reducing and preventing nitrate pollution. This Directive is one of the instruments of the WFD: the reduction of nitrates in waterbodies contributes to reaching good status for water. Member States have to implement the Nitrates Directive through the following process:

- water monitoring and identification of polluted waters or at risk of pollution;
- identification of areas to be classified as 'Nitrate Vulnerable Zones' (NVZs);
- establishment of codes of good agricultural practices (compulsory if within NVZs or on a voluntary basis in other areas);
- establishment of action programmes by farmers within NVZs on a compulsory basis;
- national monitoring and reporting (Member States must report to the Commission every four years).

According to Annex III of the Nitrates Directive, measures included in Member States' action programmes must include rules related to:

- periods when land application of certain types of fertiliser is prohibited;
- the capacity of storage vessels for livestock manure;
- the limitation of land application of fertilisers, taking into account the characteristics of the vulnerable zone concerned;
- the maximum amount of manure to be used.

### **2.2.3.2 Sustainable Use of Pesticides Directive**

The Sustainable Use of Pesticides Directive (2009/128/EC) establishes a framework for European action to achieve sustainable use of pesticides. It aims to 'reduce risks and impacts of pesticide use on human health and the environment, and encourage the use of Integrated Pest Management (IPM) and of alternative approaches or techniques, such as non-chemical alternatives to pesticides'<sup>38</sup>.

The implementation of this Directive is performed through National Action Plans. Article 4(1) sets out that 'National Action Plans must consider plans under other European legislation on the use of pesticides, such as planned measures under Directive 2000/60/EC' [the WFD]. The main actions described by the Directive consist in:

- training of users, advisers and distributors of pesticides;
- inspection of pesticide application equipment;
- prohibition of aerial spraying and limitation of pesticide use in sensitive areas;
- informing about pesticide risks and promoting IPM.

### **2.2.3.3 Floods Directive**

The EU Floods Directive (2007/60/EC) entered into force on 26 November 2007. This Directive is focused on flood risk assessment and management. Its objective is to reduce and manage the risks that floods pose to human health, the environment, cultural heritage and economic activity. The Member States shall identify the river basins and related coastal areas that are at risk of flooding.

The Floods Directive was created with the aim of developing a strong link with the WFD. Following the example of the RBMPs in the Water Framework Directive, the Floods Directive requires Member States

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<sup>38</sup> Sustainable Use of Pesticides Directive (2009/128/EC) - Article 4(1).

to establish Flood Risk Management Plans (FRMP). Member States shall coordinate their FRMP with neighbouring countries sharing the same river basin. Administrative entities shall be the same as for the WFD; the first FRMP were to be started in 2016, at the same time as the 2<sup>nd</sup> cycle of the RBMPs.

### 2.2.3.4 EU Drinking Water Directive

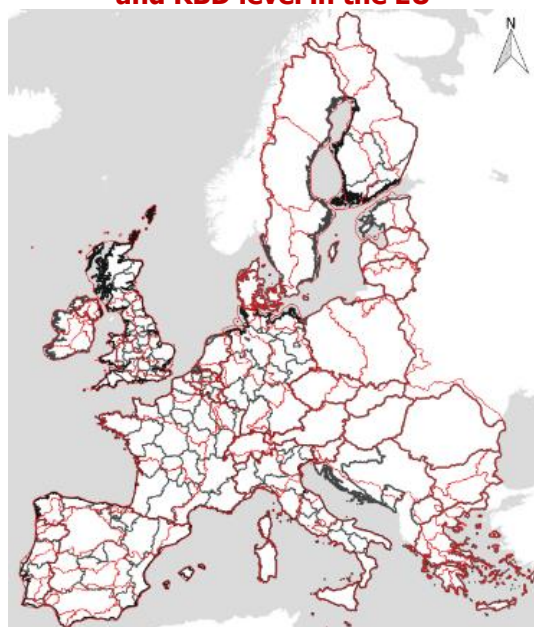
The Drinking Water Directive (Council Directive 98/83/EC) aims at protecting the quality of water intended for human consumption. Adequate information made available to consumers is required, and a report on drinking water quality must be submitted to the Commission every three years. The Directive also sets up quality standards for a list of 48 chemical, microbiological and indicator parameters to be complied with. Parameters and parametric values are given in its Annex I.

This Directive does not have a direct link with agriculture, as it does not state that specific measures from the agricultural sector should be implemented. Nevertheless, among the list of 48 parameters verified, some may come from agricultural origin, such as nitrates, nitrites and pesticides. The WFD refers to the EU Drinking Water Directive through its Article 7 and recalls the obligation of compliance with the Drinking Water Directive for waterbodies used for the abstraction of drinking water.

### 2.2.4 RDP AND RBD DELINEATION

The following figure highlights the differences in the management level of programmes resulting from the CAP policy on Rural Development (RDPs) and the Water Framework Directive (at the RBD scale).

**Figure 6: Delineation of RDP management level and RBD level in the EU**



RDP management level  
 RBD

While in eastern Member States the management level of RBDs can be very similar to the RDP management level, it is very different in western Member States. Indeed, in some EU Member States, the RBDs may cover multiple RDPs. In general, when RDPs are managed at regional level, the delineation varies considerably between RBDs and RDPs.

Source: Alliance Environnement

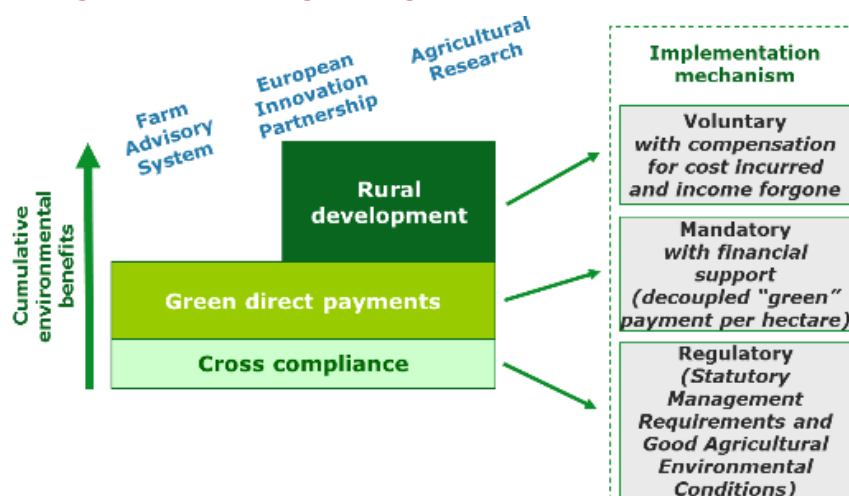


### 3 INTERVENTION LOGIC OF THE WATER-RELATED CAP INSTRUMENTS AND MEASURES

#### 3.1 INTEGRATION OF ENVIRONMENTAL CONCERNS INTO THE CAP

The 2013 CAP reform brought a significant change in the way the CAP contributes to the explicit objective of the 'sustainable management of natural resources and climate action', namely through the introduction of the new greening measures under Pillar I. For the 2014-2020 period, progress towards this objective can be assisted through the combined effects of a number of different CAP measures. These encompass cross-compliance, direct payments under the EAGF and rural development policy under the EAFRD, and they can be accompanied by support from the Farm Advisory Service and the activities of the European Innovation Partnership (EIP) for Agriculture and the national Operational Groups (see figure below).

**Figure 7: The new greening architecture of the 2013 CAP**



Source: DG Agriculture and Rural Development

Thus, environmental integration in the CAP is reflected via four main types of measures (EC, 2016<sup>39</sup>):

- 'Measures targeted towards objectives such as market stability or income support having positive secondary effects on the environment or contributing to maintaining environmentally beneficial structures or types of farming (e.g. Areas with Natural Constraints payments);
- Measures targeted towards objectives such as income support, designed to contribute to the enforcement of mandatory environmental requirements and the Polluter Pays principle (e.g. decoupled payments in combination with cross-compliance, greening measures);
- Measures targeted towards encouraging the providing of environmental services on a voluntary basis (e.g. agri-environment-climate measures);
- Measures targeted towards facilitating compliance with compulsory environmental requirements (e.g. 'meeting standards' measure) or compensating the relative economic disadvantage resulting from a region-specific pattern of environmental requirements (e.g. Natura 2000 and Water Framework Directive)'.

#### 3.2 IDENTIFICATION OF THE POTENTIAL EFFECTS OF THE CAP INSTRUMENTS AND MEASURES ON WATER

As presented above, the CAP overall framework provides various instruments and measures, specifically designed to achieve environmental goals, that may have contributed to improve water management, protection and water use by agriculture.

<sup>39</sup> [http://ec.europa.eu/agriculture/envir/cap/index\\_en.htm](http://ec.europa.eu/agriculture/envir/cap/index_en.htm) consulted on 30/04/2016.

### **3.2.1 ENVIRONMENTAL CAP MEASURES AND INSTRUMENTS WITH EFFECTS ON WATER**

As described in the previous section 2.2.1, the CAP instruments and measures can influence water quality by enforcing or supporting practices that:

- reduce the amount of nutrients, organic wastes and chemicals applied on land;
- decrease the risk of transfer of such pollutants into waters by preventing leaching and runoff;
- decrease soil and bank erosion.

Then, to reduce the agricultural pressures on water quantity, the CAP instruments and measures provide a regulatory frame and support to practices that:

- decrease water abstraction for irrigation;
- improve water retention in soil; and
- improve bank stabilisation.

The effects of these CAP instruments and measures on agricultural practices and the corresponding pressures affecting water are described in ESQs 3 to 7.

### **3.2.2 OTHER POTENTIAL EFFECTS OF THE CAP INSTRUMENTS AND MEASURES ON WATER**

Specific CAP instruments and measures may support farm management systems or agricultural practices not beneficial for water. Direct payments may favour less profitable holdings by providing them income support. This aspect has been examined in the ESQ 7. The related FADN analysis considered whether farm types more dependent of CAP support made positive choices for water-related aspects (level of inputs used, irrigated area, etc.) and whether individual CAP instruments and measures caused unintended negative effects on water.

## **3.3 INTERVENTION LOGIC DIAGRAMS**

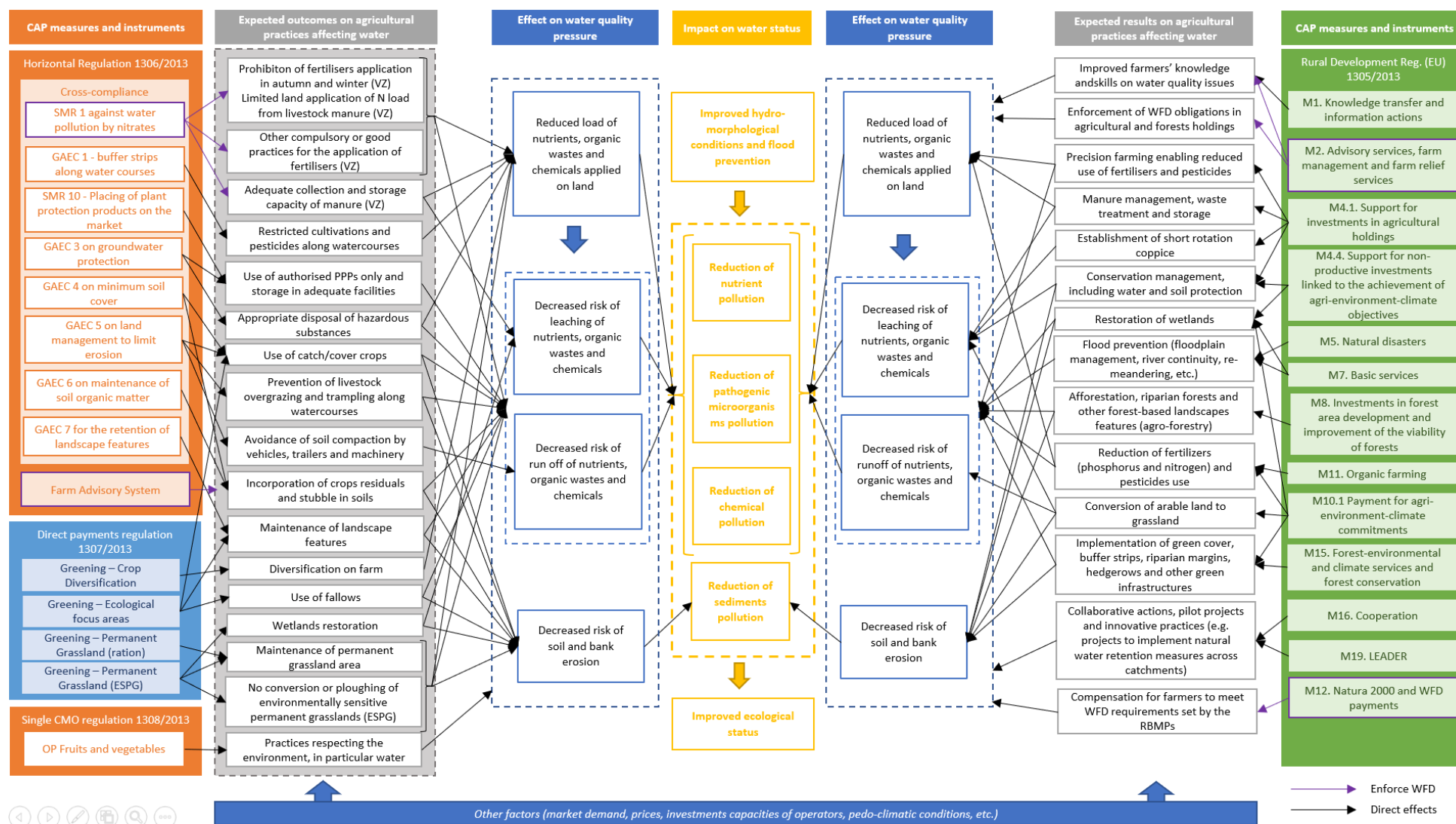
The intervention logics for both sets of tools addressing (a) water quality issues and (b) water quantity issues are summarised in the diagrams below. They provide a voluntarily simplified view of the expected results and related impact on water of the CAP instruments and measures.

The objective of these diagrams is to examine the theoretical links between measures and results:

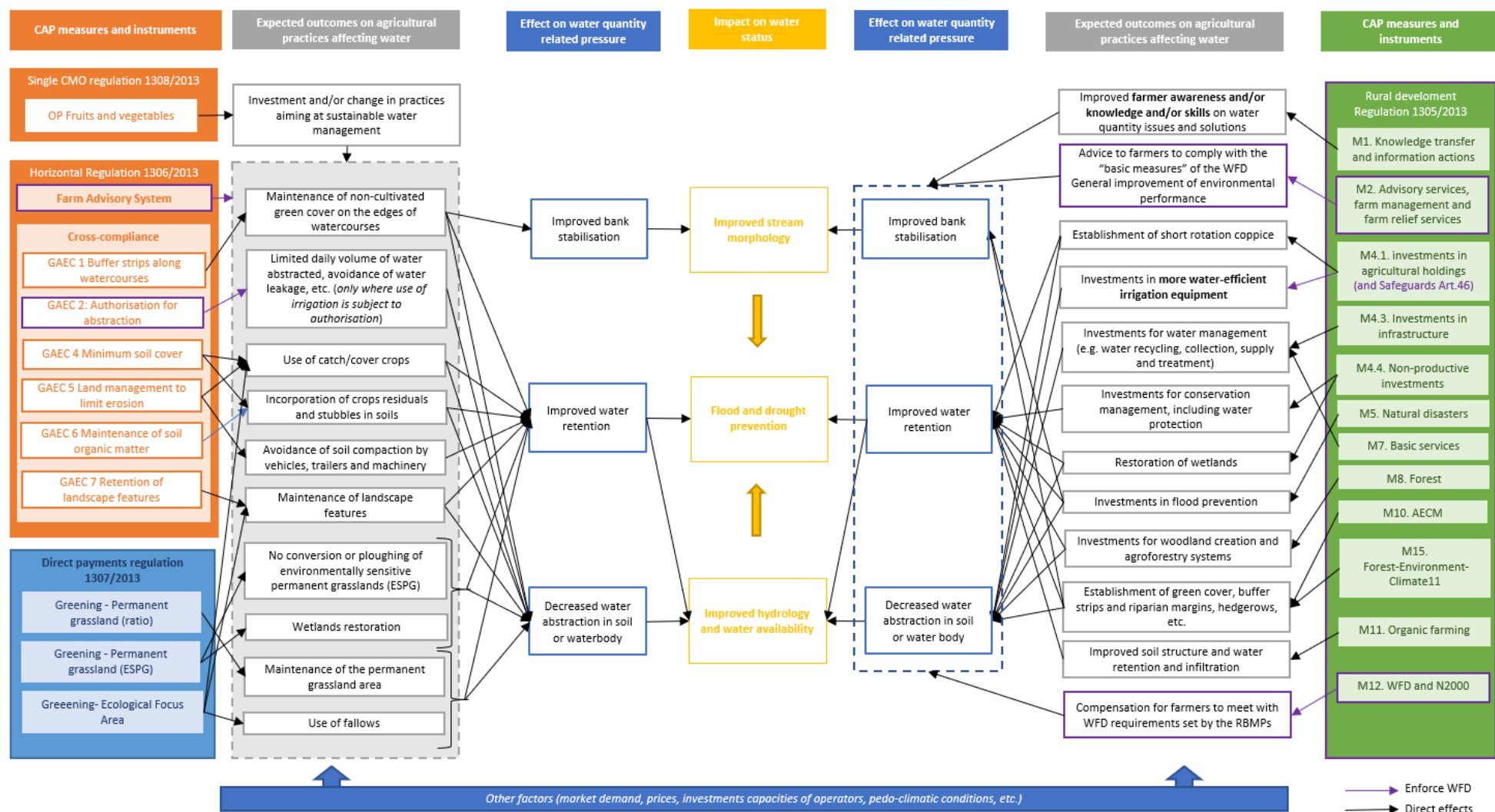
- The implementation of the evaluated measures is supposed to lead to expected outcomes on farmers' practices or land use,
- These changes in practices or land use may have effects (beneficial or not) on water quality (first diagram) or quantity (second diagram),
- These effects may have an impact on the related water status in both quality and quantity.

The diagrams illustrate the hypotheses that are tested in the evaluation of the effectiveness of the CAP instruments and measures, each arrow being a hypothesis to be confirmed or rebutted.

**Figure 8: Intervention logic on the objective of sustainable quality management (water quality)**



**Figure 9: Intervention logic on the objective of sustainable quantity management (water quantity)**



## 4 GENERAL PRINCIPLES AND METHODS FOR THE EVALUATION

This chapter sets out the overall methodological approach adopted for this evaluation study. It identifies the counterfactual situation and describes the broad principles of the evaluation and the range of tools used. It also provides information on the range of indicators available and underlines the limitations to the methodological approach. Finally, it sets out the methodology used to identify the case-study Member States and RBDs.

### 4.1 DEVELOPMENT OF AN EVALUATION FRAMEWORK

The methodological approach and tools chosen for this evaluation are based on the Better Regulation guidance and toolbox and on DG AGRI guidance documents. The methodological approach focuses on the development of an evaluation framework. The starting point for the development of the evaluation framework is the intervention logic of CAP instruments and measures addressing sustainable management of natural resources and climate action, as described in Part 3. This is used to identify the judgement criteria and related performance indicators upon which the evaluation will be primarily based. To isolate the effects of the CAP on water, the evaluation adopted a counterfactual approach (see below). The methodological approach that was adopted combines theoretical and empirical approaches and includes a variety of methods, both quantitative and qualitative, to address the different types of analysis that might be required in the evaluation.

### 4.2 COUNTERFACTUAL ANALYSIS

To conclude on the proper effects of the CAP instruments and measures on water, the comparison with a counterfactual situation without the policy (i.e. what would have happened in the absence of the CAP support) is necessary. Depending on the purposes of the various questions, different counterfactual situations were used.

Generally, the actual situation was compared to a theoretical situation without the measures, produced from the analysis of the intervention logic and theoretical assumptions derived from the literature.

In addition, for the purposes of data analysis, an empirical counterfactual was used when measures or instruments were introduced by the 2013 reform (then before/after 2013 was taken as a comparison point); or when measures have not been applied uniformly among Member States or regions. When using this approach, Member States or RBDs with similar contexts were chosen as much as possible, in order to isolate the proper effects of CAP policy instruments and measures.

FADN data were also used to compare the practices implemented in similar types of farms benefiting or not from the CAP support (when necessary and possible<sup>40</sup>).

### 4.3 DATA COLLECTION TOOLS

The following table presents the range of tools used in this evaluation study of CAP impact on water.

**Table 6: Data collection tools used for the evaluation study**

Tool	Brief description or remarks on the tool	Type of tool	Relevant ESQ
Documentary research Literature Reviews	In addition to the documentary research used to answer the ESQs, specific literature reviews have been performed on key subjects: (a) the theoretical effects of changes in pressures on water quantity and quality; (b) the role played by agricultural practices on water-related pressures.	Qualitative and quantitative	All
Statistical data entry	The statistical data used as part of this evaluation are presented in the following section.	Quantitative	Effectiveness Efficiency Relevance
Interviews	Used to gather in-depth qualitative information and the opinions of key stakeholders relative to context, implementation and results. These interviews have been conducted as part of the case studies (see below)	Qualitative	All

<sup>40</sup> No result can be presented if representing less than 15 farmers.



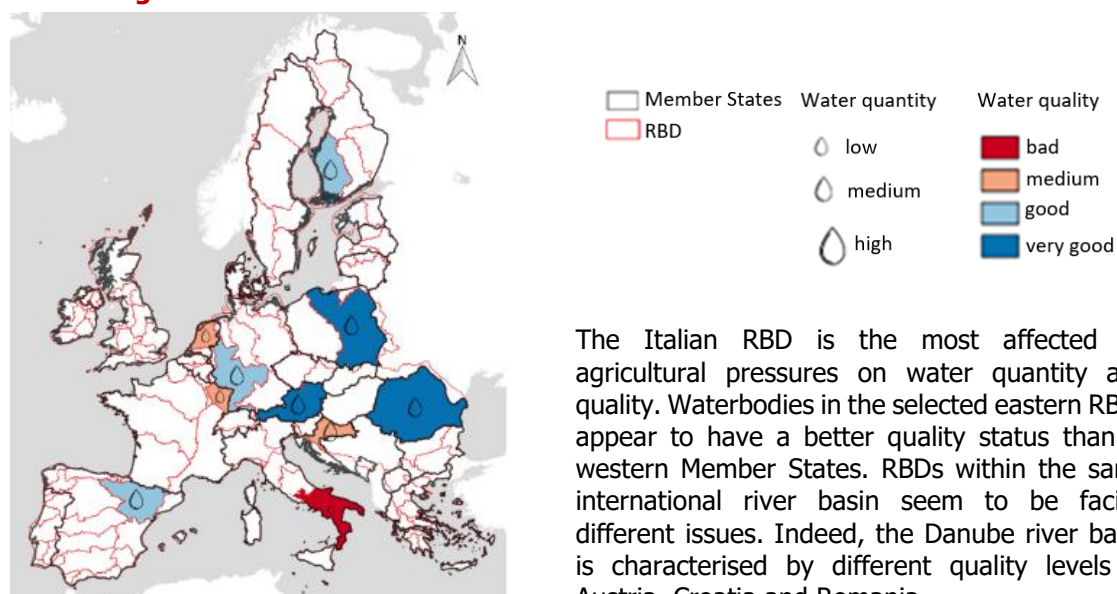
Tool	Brief description or remarks on the tool	Type of tool	Relevant ESQ
Case studies	Case studies are used as an evaluation tool when 'how' and 'why' questions are being posed. They allow a detailed examination of specific issues to be carried out in line with the evaluation goals. The content and methodology of case studies is detailed in section 4.4.	Qualitative and quantitative	All
Survey	A survey has been carried out in case-study Member States, in order to collect qualitative information on the drivers and choices made by the farmers regarding their practices and their uptake of innovations, in a standardised way. The survey made it possible to collect the views of 120 farm advisers in the 10 case-study MS.	Qualitative and quantitative	Causal analysis Effectiveness

## 4.4 APPROACH TO THE SELECTION AND IMPLEMENTATION OF THE CASE STUDIES

### 4.4.1 OVERALL METHODOLOGY FOR SELECTION

The geographical level to perform the case studies was the River Basin District (RBD), as it is the implementation level of River Basin Management Plans (RBMPs). The selection of the case studies took into consideration the characteristics of the RBDs (geographical, agricultural and hydrological features) and the implementation of the CAP instruments and measures (e.g. budget allocated to water-relevant priorities, Focus Areas or specific measures). The RBD selection was performed based on the European Environment Agency indicators of agricultural pressures on surface and groundwater bodies (SWBs and GWBs) and their ecological and chemical statuses. The implementation of the Rural Development Programmes at national/regional level (depending on the Member State) was taken into account when relevant, i.e. to identify the RDPs in force on the RBD considered. The choice was made to focus on a single Rural Development Programme (RDP) in RBDs with many RDPs. This concerns France, Italy, Germany and Spain, where the RDPs are implemented at regional level. Furthermore, consideration was given to the river basins location. Indeed, river basins located over Member States' borders were particularly interesting, as they provide examples of strategic choices made by different Member States to address specific issues in a given context. For example, the Rhine and the Danube are two major European rivers crossing different Member States and providing water to a significant part of the EU population. For this reason, several RBDs from these two river basins have been selected as case studies. The following figure highlights the River Basin Districts selected at EU level and their corresponding issues as regards water availability and quality.

**Figure 10: River Basin Districts selected for case studies at EU level**



The Italian RBD is the most affected by agricultural pressures on water quantity and quality. Waterbodies in the selected eastern RBDs appear to have a better quality status than in western Member States. RBDs within the same international river basin seem to be facing different issues. Indeed, the Danube river basin is characterised by different quality levels in Austria, Croatia and Romania.

Source: Alliance Environnement

## **4.4.2 IMPLEMENTATION OF THE CASE STUDIES: CONTENTS AND METHODOLOGY**

The case studies made it possible to collect primary and secondary information to support the development of the counterfactual and the responses to the ESQs (statistical data collection at national, regional and local level, documentary research, including literature reviews, and interviews). Their aim is to provide a clear view of the CAP instruments and measures implemented in a specific context, with corresponding effects observed. They also helped to assess the coherence and consistency between the CAP and other water policies implemented at the same level, such as the Water Framework Directive.

All case studies followed the same general approach and applied the same methodology. The case-study template and guidance were prepared by the core study team and set out the data to be collected to set the context and answer the ESQs. This ensured the homogeneity of the information presented and the data/information collected within each case-study. The case studies were conducted by senior staff in the respective Member States and were coordinated by the central evaluation team.

## **4.5 INDICATORS AND OTHER STATISTICAL DATA USED DURING THE EVALUATION**

### **4.5.1 DATABASES AND INFORMATION ON POLICY IMPLEMENTATION**

#### **4.5.1.1 CMEF indicators**

The Common Monitoring & Evaluation Framework (CMEF) includes a hierarchy of indicators, developed specifically for the monitoring and evaluation of the CAP. For the purpose of this evaluation, a selection of the most relevant context, output, result and impact indicators of water-related measures was carried out. The values were in theory available until 2017, which would have made it possible to assess changes since the new CAP implementation. However, for some indicators in some Member States, the values were still missing for this evaluation.

The analysis focused on indicators related to water-relevant Focus Areas. However, result indicators are available only at RDP and/or Member States level, which prevents their use for analyses focused on river basins. Finally, impact indicators related to water quality and abstraction, soil erosion and soil organic matter have been looked at and supplemented by an analysis of WISE data.

#### **4.5.1.2 AIR**

Annual Implementation Reports are submitted each year by Member States to the EC and gather all the Pillar II implementation data of RDPs provided by each Member State. The AIR database has been used to compare planned, committed and implemented budgets under water-related measures and Focus Areas.

#### **4.5.1.3 CATS**

The Clearance Audit Trail System (CATS) compiles financial and control data of Pillar I and Pillar II. CATS data were used to obtain the expenditure and number of beneficiaries of Pillar I payment schemes and in particular to calculate VCS amount per unit. For Pillar II, CMEF indicators and AIR data were preferred as respectively providing a higher range of indicators and planned and committed expenditure. Since CATS data are not provided at the RBD level, a Geographic Information System method was used to allocate the data at NUTS3 level to each River Basin studied.

### **4.5.2 EU THEMATIC DATABASES**

#### **4.5.2.1 WISE**

The Water Information System for Europe (WISE) is a partnership between the European Commission (DG Environment, Joint Research Centre and Eurostat) and the European Environment Agency. As part of this partnership, an online Water Data Centre provides water-related data and maps at EU level on water status and pressures. Most of the data are available at Member State, RBD and sub-unit level for

the two periods covering the first and the second RBMPs. These data sets were used to assess the change in water status and pressures between these two periods. However, the reporting implemented by Member State to record waterbodies subject to specific pressures preventing them from achieving good status can vary between Member States and also between the 1<sup>st</sup> and 2<sup>nd</sup> RBMP. Hence, the absence of waterbodies recorded for a Member State in the analytical tables do not necessarily mean that no pressures existed. Moreover, the database does not make it possible to assess the share of waterbodies failing to achieve good status because of significant agricultural pressures.

#### **4.5.2.2 Eurostat**

Eurostat data, especially the agri-environmental indicators (AEI), were used for this evaluation in the descriptive chapter and to observe trends in pressures related to water at EU level (e.g. sales of fertilisers and pesticides).

#### **4.5.2.3 FSS**

A Farm Structure Survey (FSS) is conducted every three or four years by each Member State at regional level (NUTS 3). The collected data are forwarded to the Eurostat database. Information used for the evaluation principally concerns livestock numbers and land use, as the share of irrigable and irrigated area or the share of arable land in the UAA. However, at the time of analysis, data concerning livestock numbers after 2015 were not available.

#### **4.5.2.4 LUCAS**

The Land Use and Coverage Area frame Survey (LUCAS) collects information on land cover and land use on more than 250,000 sample points throughout the EU every three years. In 2009 and 2015, surveyors also gathered 20,000 soil samples to analyse physical and chemical characteristics of soil under various climate and pedological conditions. LUCAS 2018 data were used to assess the share of ploughed areas, the share of area with grass margins, signs of erosion and the percentage of land with water management equipment at the RBD level. However, comparison with the primary data of 2009 and 2015 is not possible because of many missing values for these years. For soil analysis data, the European Soil Data Centre indicated that 2015 data will be published during summer 2019. Thus, only 2009 data were used in the evaluation to appraise the quantity of soil organic carbon, the available water content or bulk density and their impact on water in the EU RBDs.

#### **4.5.3 FADN**

The Farm Accountancy Data Network (FADN) provides detailed accounting data at farm level. It is the only microeconomic database harmonised at EU level. It allows information to be computed about the structure of holdings, their production, their livestock intensity, their consumption of fertilisers and phytosanitary products, their level of subsidies and their economic results by different farm types, Member States or regions (each farmer is geo-referenced at NUTS 3 level). Additional variables have been introduced in the FADN since 2015 to report on the new CAP implementation. These data have been studied for 2015 and 2016 (last year available) in the case-study RBDs to establish 1) potential correlations between the level of support granted to farms and their practices or their level of pressures on water and 2) changes in practices or level of pressures of farmers receiving (or not) support under Pillar II.

Lack of data for 2017 and 2018 limit the assessment of CAP effects achieved over the programming period. The FADN also shows inconsistencies concerning irrigated areas before 2015 and does not provide data about protein crop premiums before 2015. Finally, its limited size of samples restricts possibilities for analysis because the minimal sample of 15 farmers needed for the analysis is often not reached.



## 4.6 LIMITATIONS OF THE METHOD PROPOSED

### 4.6.1 ASSESSMENT OF THE EFFECTS ON WATER

The relationships between the agricultural practices fostered by the CAP and environmental outcomes is complex and influenced by many factors. Moreover, to affect water quality and quantity, the outcomes must be achieved in appropriate locations or on a sufficient geographical and historical scale. For instance, long residence time of groundwater may cause delays (from years to decades) between the application of nutrient/fertilisers control measures and improvements in water quality.

### 4.6.2 AVAILABILITY OF ADEQUATE DATA ON WATER-RELATED MEASURES

Data are not always available to assess the effects of CAP measures and instruments, because of discrepancies in the time period or the geographical scale to be considered. For example, WISE data are available for the two periods of time covered by the RBMPs, but the specific year when the data were collected is not mentioned. Another issue is that RDP implementation data are not available on the type of operations supported. It is thus difficult to identify the measures with potential effects on water quality and quantity. Therefore, details on the types of operations supported and the corresponding executed budget were collected in case studies. The CMEF result and impact indicators are not related to specific measures, and the causal link between measures and impacts or results cannot be explicitly drawn. Furthermore, water-relevant sub-measures may have been programmed under other FAs or Priorities when the actions also benefit other objectives (e.g. farm competitiveness, etc.). In this case, the measure will not be identified as potentially relevant in addressing water issues as part of this evaluation. Furthermore, only FA 5A explicitly targets water protection. For Priority 4 (restoring, preserving and enhancing ecosystems), expenditures have not been broken down among the FAs; therefore actions relevant to biodiversity and with no or limited effects on water can be included. The other water-relevant FAs and Priorities (5D and 5E) target practices or actions contributing to water protection rather than water protection.

Whereas FADN data were used to examine potential correlation between agricultural practices implemented and CAP supports, several limitations arise from the use of the database (see the box below).

#### Box 2: Limitations on the use of the FADN

Specificities of the FADN should be kept in mind when interpreting the data, and precautions must be taken for the analysis:

- The FADN does not include all agricultural holdings in the European Union; it includes only those which can be considered as commercial professional farms on account of their economic size. The definition of minimum economic size is specific to individual Member States.
- The FADN includes only data on a sample of farms in each Member State. Thus, the use of weighted factors is necessary to represent EU agriculture adequately.
- The FADN sample varies over time: each year, a certain proportion of farms leaves the sample, and a similar proportion of new farms enters. Thus, depending on the type of analysis, identifying changes in the practices or level of pressures on water of farms after the 2013 CAP reform would require the use of constant farm samples. This would essentially involve extracting from the FADN database the same farms present in the sample for all years of the interval under analysis. However, in practice, it is difficult to have constant farm samples for a long-term interval, as the number of farms remaining in a sample diminishes significantly with each additional year.
- It should also be emphasised that the FADN database refers to farms rather than to specific agricultural activities. Thus, to analyse changes related to a specific production, samples of specialised farms must be used. Types of farming are defined in the FADN as the 'relative importance of the different enterprises on the farm', measured quantitatively as a proportion of each enterprise's output to the farms' total output. A farm is considered as specialised in one specific Farm Type when more than two-thirds of its total output is provided by one specific activity.
- Finally, in accordance with FADN rules, samples with less than 15 farms have not been analysed.

## 5 REPLIES TO THE EVALUATION STUDY QUESTIONS (ESQs)

Chapter 5 provides replies to evaluation questions on CAP implementation choices and related drivers of the Member States (ESQ 1 and 2), effects of the CAP instruments and measures on agricultural practices and corresponding pressures on water (ESQ 3 to 7), development of water-relevant innovations (ESQ 8), efficiency (ESQ 9 and 10), relevance (ESQ 11), coherence (ESQ 12 and 13) and EU added value (ESQ 14) of the CAP instruments and measures affecting water status.

### 5.1 CAUSAL ANALYSIS – ESQ 1: WHAT IS THE ARCHITECTURE OF CAP IMPLEMENTATION IN MEMBER STATES IN RELATION TO CAP INSTRUMENTS AND MEASURES HAVING EFFECTS ON WATER QUANTITY AND QUALITY (I.E. CHOICES CONCERNING PILLARS I AND II)?

#### 5.1.1 UNDERSTANDING OF THE QUESTION AND METHODOLOGICAL APPROACH

CAP support may vary significantly between Member States and regions, depending on the CAP instruments and measures implemented and the allocated budgets. Moreover, under the cross-compliance scheme, subsidiarity was granted to Member States to establish the detailed requirements farmers must comply with to receive CAP support.

This question aims at analysing the selection choices of Member States regarding the CAP instruments and measures affecting water and assesses the extent to which these CAP implementation choices were targeted towards water objectives. The study 'Mapping and analysis of the implementation of the CAP', carried out in the first years of the programming period, showed that the extent to which Member States address their water needs and priorities via the CAP, particularly their RDPs, differs from one Member State to another. Furthermore, 'there are concerns that the funding available and the way it is used is insufficient to address the environmental and climate needs and priorities identified' (Ecorys *et al.*, 2016).

The overall approach used to reply to the ESQ consisted in describing the measures and instruments implemented by the Member States, which can affect farming practices and corresponding pressures on water (e.g. operations/sectors supported, eligibility criteria, budget allocation). The analysis focuses specifically on the choices made in the case-study regions or Member States. Regarding Pillar II, specific Priorities and Focus Areas were identified as having either a direct or indirect effect on water (see table below). Only the budget dedicated to these relevant priorities and focus areas was considered in the analysis.

**Table 7: Water-relevant Priorities and Focus Area**

Direct effects on water quality and quantity	Indirect effects on water quality and quantity
<b>Focus Area 4B:</b> Improving water management <b>Focus Area 5A:</b> Increasing efficiency in water use by agriculture	<b>Focus Area 5D:</b> Reducing greenhouse gas and ammonia emissions from agriculture <b>Focus Area 5E:</b> Fostering carbon conservation and sequestration in agriculture and forestry

Source: Alliance Environnement

**NOTA BENE:** Priority 4 which aims at 'restoring, preserving and enhancing the ecosystems' actually entails three FAs. Only FA 4B is focused on improving water management, whereas FA 4A is focused on enhancing biodiversity and FA 4C on preventing soil erosion. However, the analysis of the RDP budget allocated to FA 4B is not possible because Member States chose not to distinguish the budget allocated to FAs under Priority 4. The P4 budget was therefore considered as a whole in the analysis, although specific actions supported may not directly target water (e.g. protection of specific species habitats).

#### 5.1.2 OVERALL BUDGET ALLOCATED BY MEMBER STATES TO WATER-RELEVANT INSTRUMENTS AND MEASURES UNDER PILLAR I AND PILLAR II

The CAP measures and instruments addressing the sustainable management of natural resources, including water, are the greening measures (Pillar I) and specific RDP measures financed under water-

relevant priorities and Focus Areas (Pillar II). The budgetary analysis below reveals the weight assigned by Member States to these 'water-relevant' measures in the overall CAP framework.

### **5.1.2.1 Pillar I: Payments for agricultural practices beneficial to the climate and the environment (greening measures)**

Under the greening measures, a set share of 30% of the direct payments budget is granted for qualifying farmers complying with agricultural practices beneficial to the climate and the environment, though the payments are not linked/allocated per greening measures. The Basic Payment Scheme/Single Area Payment Scheme (BPS/SAPS) and the greening payments represent by far the two most important Pillar I instruments, with respectively €35.4 billion and €23.3 billion spent over the 2015-2017 period at the EU level (i.e. 40% and 26.3% of the total budget spent under Pillar I).

### **5.1.2.2 Pillar II: Budget allocated to water-relevant priorities and measures in the Rural Development Programmes**

#### **Planned budget under water-relevant priorities and focus areas**

The analysis considered the budget allocated by the Member States to Priority (P) 4<sup>41</sup>, FA 5A, 5E and 5D. The Member States allocated nearly €80 billion, i.e. more than 50% of the Pillar II overall budget, to these priorities. Among the European Union, France is the Member State with the highest budget, followed by Italy, Germany, Spain and Finland.

Priority 4 'Restoring, Preserving and Enhancing Ecosystems' is the one with the highest planned budget in the majority of the Member States (overall budget planned under P4 reached €70.8 billion at EU level). Most of the operations supported under this Priority are expected to boost water protection. Only 14 Member States decided to allocate budget to Focus Area 5A (representing €3.2 billion at EU level), which requires increased efficiency in water use by the agricultural sector<sup>42</sup>. These Member States are mainly southern ones (EL, ES, FR, IT, PT, RO). In other Member States (e.g. BG, HU, AT, UK), the RDP budget allocated to this FA is rather low.

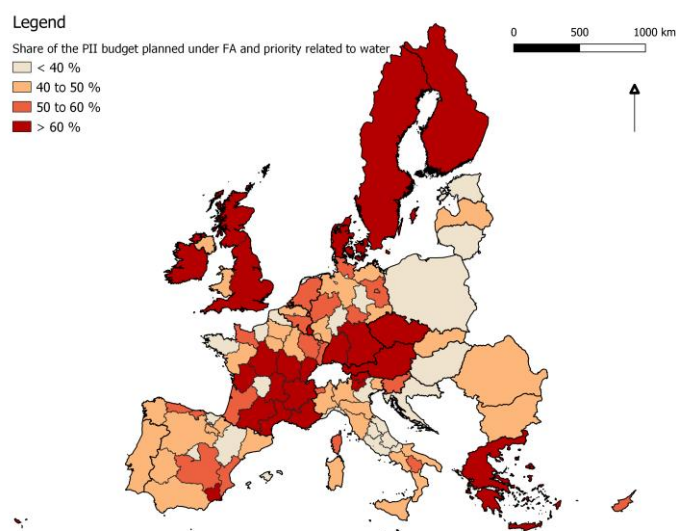
In most of the Member States, the share of RDP budget programmed under Priority 4, FA 5A, 5E and 5D is significant: seven Member States (CZ, DK, IE, EL, LU, AT, SE) have allocated more than 60% of their budget to Priority 4 and FAs, four Member States (CY, MT, NL, SI) 50% to 60% and four Member States (BG, LV, RO, SK) 40% to 50%.

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<sup>41</sup> As explained, most Member States did not distinguish the budget allocated to Focus Areas under Priority 4. It is thus not possible to focus on the budget programmed under water-relevant FA 4B 'improving water management, including fertiliser and pesticides management' and 4C 'preventing soil erosion and improving soil management'.

<sup>42</sup> Member States that chose to allocate budget under Focus Area 5A must comply with an *ex-ante* conditionality on the existence of (a) a water pricing policy providing appropriate incentives for users to use water resources efficiently and (b) an appropriate contribution of the different water uses to the recovery of the costs of water services.

**Figure 11: Share of RDP planned budget dedicated to P4, FA 5A, 5E and 5D for 2014-2020**



Source: AIR, 2017

### **Planned budget allocated to RDP measures under relevant priorities and focus areas**

According to the Annual Implementation Report, the measures with the highest planned budget dedicated to Priority 4, FA 5A, 5E and 5D are the following (in order of importance):

- **M10** – Agri-environment and climate measure (AECM)
- **M13** - Compensatory allowance scheme for areas with natural constraints
- **M11** - Organic farming
- **M8** - Investments in forest area development and improvement of the viability of forests
- **M4** - Investments in physical assets

Operations supported under these measures can therefore contribute to the priority and FA mentioned, in accordance with the strategy established by the Member States.

### **5.1.2.3 Flexibility between Pillars**

Regarding flexibility between the two Pillars, the Member States' implementation choices in relation to this mechanism resulted in a net transfer of Pillar I budget to Pillar II. Eleven Member States have chosen to transfer all or part of the 15% allowed from direct payments to rural development, notably the UK, EE and LV (with respectively 10.8%, between 14.3% to 15% according to the year, and 7.5% of national ceiling between 2017-2019).

### **5.1.3 WATER-RELEVANT OPERATIONS TARGETED BY MEMBER STATES UNDER CAP INSTRUMENTS AND MEASURES FOR SUSTAINABLE MANAGEMENT OF NATURAL RESOURCES AND CLIMATE ACTION**

Flexibility is left to Member States for the implementation of CAP instruments and measures. This part examines how the Member States addressed water issues through CAP implementation choices.

#### **5.1.3.1 Cross-compliance choices targeting water issues**

The implementation of the GAEC and SMR (cross-compliance) was examined by considering the checklists for cross-compliance controls established in case-study Member States. It is considered here that on-the-spot checks for cross-compliance determine the requirements actually assigned to farmers under GAECs and SMRs, which can be more or less stringent depending on the Member States' choices.

The table below provides an overview of the cross-compliance requirements targeted at or influencing water issues associated with each GAEC and SMR. The analysis examined the level of requirements in

relation to water by considering the number of items verified on-farm and their relevance for water protection. Member States were then distributed into three categories according to their level of constraint on farmers in terms of practices beneficial for water protection.

**Table 8: Cross-compliance requirements on water issues in case-study MS**

Group	Type	Name	DE*	ES	FR	HR	IT*	NL	AT	PL	RO	FI
Cross-compliance	GAEC 1	Buffer strips along watercourses										
	GAEC 2	Authorisation for abstraction										
	GAEC 3	Groundwater protection										
	GAEC 4	Minimum soil cover										
	GAEC 5	Land management to limit erosion										
	GAEC 6	Maintenance of soil organic matter										
	GAEC 7	Retention of landscape features										
	SMR 1	Protecting water against nitrates pollution										
	SMR 10	Placing of plant protection on the market										

Legend:

	Low level of requirements
	Medium level of requirements
	High level of requirements

\* For Member States in which the cross-compliance checklists are established at regional level – the control points considered are those of the North Rhine-Westphalia (DE) and Apulia (IT) case-study regions.

Source: Case-study report

The analysis of the checklists used for on-the-spot checks in case-study Member States shows that the level of requirements set up by Member States under cross-compliance ensures minimum water protection. GAEC 1, GAEC 2, GAEC 3, SMR 1 and SMR 10 directly target water protection. GAEC 4, GAEC 5, GAEC 6 and GAEC 7 also contribute to water protection by preventing soil erosion and decreasing the transfer of pollutants into waters through runoff and leaching.

Under GAEC 1, buffer strips along water courses are required both within and outside Nitrates Vulnerable Zones (NVZ). Annex II of Regulation (EU) No 1306/2013 emphasises that buffer strips must respect the requirements for land application of fertiliser near watercourses as set out in the Code of Good Agricultural Practices established by Member States according to the Nitrates Directive. Outside NVZ, the requirements set by Member States under the Nitrates Directive for land application of fertiliser near water courses must be respected. Hence, all case-study Member States verify whether or not fertilisers were applied on buffer strips (the information was not available for AT and RO). The application of manure was forbidden in 7 out of 10 case-study Member States/regions only, and the application of pesticides in six Member States/regions whereas not compulsory in the EC regulation. The minimum width of buffer strips varies between Member States (from 0.5 to 25 metres depending on the case)<sup>43</sup>. Only five Member States/regions checked whether there is minimum vegetation cover on buffer strips.

**As a result, Member States' choices regarding the implementation of GAEC 1 do not always prevent pollution from nutrients, soil erosion and pesticides into watercourses in all Member States, even if some of them have enforced stricter rules than the EU provisions.**

GAEC 2 must ensure that farmers comply with authorisation procedures in areas where the use of water for irrigation is subject to authorisation. The checklists in case-study Member States/regions all examine the authorisation order of farmers to use water for irrigation. However, only five of them verify the compliance of farmers with the authorisation order and only two check whether there are appropriate means to measure the water abstracted for irrigation. **Member States' choices regarding the implementation of GAEC 2 do not always guarantee that the volumes of water abstracted for water irrigation comply with the authorisation granted to farmers.**

GAEC 3 aims at protecting groundwater against direct discharge and indirect pollution through leaching of the listed dangerous substances. The controls therefore mainly rely on the actual observation or assumption of direct/indirect discharge of prohibited substances into waters (e.g. evidence of direct/indirect discharge of agri-chemicals, hydrocarbons etc.). Few case-study Member States also considered additional items, e.g. in North Rhine-Westphalia, the livestock manure storage distance from

<sup>43</sup> Scientific literature confirms the effects of buffer strips to protect water from run off, pollution by pesticides and in some cases nutrients even with limited width, but their effect is really visible over 3 to 5 meters width.

waters, potential leakages from storage tank of dangerous substances and improper disposal or handling of mineral oil products are also verified. **Consequently, the EU provisions for GAEC 3 are in general effective in avoiding point source pollution of groundwaters.**

SMR 1 relates to Articles 4 and 5 of the Nitrates Directive<sup>44</sup>, which requires Member States to establish a programme of actions which is compulsory in Nitrate Vulnerable Zones (NVZ) and whose items are verified under cross-compliance. The main items verified are the spreading dates of fertilisers, their application on steep slopes, the spreading distances from water points, and the suitability of storage capacities and of collection of livestock manure or other soiled water. Nitrogen fertilisation balance is also checked by Member States; however, these good practices required under SMR 1 are mainly verified through documents examination, and soil analysis is carried out only in North Rhine-Westphalia (DE), whereas it is a very good practice to verify farmers' compliance and the actual outcomes of SMR 1. Three Member States also check soil coverage during winter or along watercourses. **Hence, SMR 1 has been implemented in a way that effectively protects water from nutrient pollution. However, it only applies in NVZ.** Five case-study Member States designated their whole territory as NVZ (NL, AT, PL, RO, FI) and only five designated specific areas where water bodies exceeded 50 mg N/l (DE, ES, FR, HR, IT).

SMR 10 relates to Article 55 of Directive 1107/2009/EC on the use of plant protection products, which requires the application of the principles of good plant protection practices and compliance with market authorisations. The checklists used for on-the-spot checks of SMR 10 in case-study Member States therefore consider the compliance with the Marketing Authorities in terms of products used, dose applied, pre-harvest interval, etc. Most Member States also check the validity of the individual certificate for the use of phytosanitary products, the specific storage facilities and the existence of specific areas to fill and rinse the sprayer equipment, although this differs between Member States. Among other items, five Member States (DE, FR, AT, PL and RO) verify the appropriate means to avoid product drift outside the treated area and four verify whether pesticides are used near surface and coastal water. However, on-the-spot checks rely on visual assumptions and verification of farm registers, so not all practices can be checked. Hence, **Member States' implementation choices, as regards SMR 10 in general, effectively prevent point source pollution of phytosanitary products and use of unauthorised products.**

For the other GAECs with more indirect effect on water, GAEC 4 on minimum soil cover is more or less demanding depending on the Member State, but most of them require minimum soil cover on fallow lands (DE, FR, NL, AT, FI), which should effectively reduce the risk of erosion, runoff and leaching. GAEC 5 on land management to limit soil erosion forbids the ploughing of slope plots (7 Member States), tillage of waterlogged or flooded land (3 Member States) and 'any other activity likely to cause soil erosion' (4 Member States). GAEC 6 on the maintenance of soil organic matter mostly relies on the ban of burning crop residues such as straw<sup>45</sup>, which do not have a significant effect on soil water retention capacity or ability to retain pollutants. Finally, under GAEC 7 on retention of landscape features, most Member States have set for farmers the obligation of conserving hedgerows, but also isolated trees, trees in groups or trees in lines, ponds and ditches<sup>46</sup> which are all likely to have positive effects on water. However, the level of requirements in relation to water under GAEC 7 is quite low in the Netherlands and Finland. **Hence, the implementation choices of MS for these GAECs with more indirect effect on water are varying but in most of the cases favourable to preserve water quality.**

### 5.1.3.2 Greening measures choices relevant to water

Greening measures rely on mostly on EU wide practices with only certain choices left for Member States to decide. The table below summarises these implementation choices of Member States with regard to:

- the choices of eligible EFAs and landscape features, some of which are particularly relevant for addressing water issues but are not implemented by all the studied Member States and regions;
- the permanent grassland measure – the percentage of surface declared as ESPG by Member States

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<sup>44</sup> Council Directive 91/676/EEC concerning the protection of waters against pollution caused by nitrates from agricultural sources.

<sup>45</sup> A few MS have additional requirements such as crop rotation or incorporation of crop residues.

<sup>46</sup> Six Member States require authorisation before landscape feature removal.



is determinant, as ESPG permanent grassland cannot be ploughed and is particularly relevant for water quality and quantity aspects;

- the exemptions and equivalence practices recognised by Member States under the crop diversification measure, as they can lower the level of requirements and subsequent positive effects on water.

**Table 9: Case-study Member States' choices concerning greening payments**

Group	Type	Name	DE	ES	FR	HR	IT	NL	AT	PL	RO	FI
<b>Pillar I</b>	Greening payment	Type of EFA										
		Scale of PG Ratio										
		Declared ESPG outside Natura 2000										
		% declared ESPG /PG under ratio (inside and outside N2000)										
		Crop diversification or equivalent practice										

Legend:

Number of EFAs eligible	PG Ratio	Declared ESPG (outside N2000)	% declared ESPG /PG	Crop diversification
High number	National	No	0-10%	Low level
Medium number	Regional	Yes	10-20%	High level
Low number			>20%	

Sources: EFA: case studies;

Crop diversification and ESPG: Greening report STATISTICAL ANNEX, 2018-2019 and 'Mapping and analysis of the implementation of the CAP,' Ecorys et al. (2016)

## Ecological Focus Areas

The case-study Member States and regions which have allowed a lower number of EFA types are considered as more stringent for farmers (Aragon (ES), HR, NL, AT, PL, RO, FI). The combination of three EFA types identified as more beneficial for water (i.e. afforested areas, landscape features, catch crop and nitrogen-fixing crop) is eligible in North Rhine-Westphalia (DE), Alsace (FR), Poland and Romania. Since 2018, the use of pesticides on productive or potentially productive EFAs is forbidden (Regulation (EU) 2017/1155).

Almost all the case-study Member States and regions chose to make landscape features and buffer strips eligible under the EFA measures. However, these items are also required under GAEC 7 and GAEC 1 respectively. Thus, they were not considered as constraining under the greening payments. The table below compares the EFA types eligible under the greening measure and those required to meet cross-compliance standards.

**Table 10: Comparison of the features eligible under EFAs and required under cross-compliance in case-study Member States**

EFA types	Case-study MS where eligible as EFA	Case-study MS where required under cross-compliance
<b>Afforested areas</b>	DE, ES, FR, IT, PL, RO	
<b>Land lying fallow</b>	DE, ES, FR, HR, IT, AT, PL, FI	
<b>Terraces</b>	DE, IT, RO	DE (NRW), IT (Apulia), RO
<b>Hedges or wooded strips*</b>	DE, FR, HR, IT, PL, RO	DE (NRW), ES, FR, HR, IT (Apulia), AT, PL
<b>Isolated trees*</b>	DE, FR, HR, IT, PL, RO	DE (NRW), ES, HR, IT (Apulia), AT, PL, RO
<b>Trees in line*</b>	DE, FR, HR, IT, PL, RO	DE (NRW), ES, HR, IT (Apulia), AT, RO
<b>Trees in group/field copses*</b>	DE, FR, HR, IT, PL, RO	DE (NRW), ES, FR, HR, AT, RO, FI
<b>Field margins*</b>	DE, FR, IT, NL, PL, RO	DE (NRW), ES, AT
<b>Ponds*</b>	FR, HR, IT, AT, PL, RO	DE (NRW), FR, HR, IT (Apulia), AT, PL
<b>Ditches*</b>	DE, FR, HR, IT, AT, PL, RO	DE (NRW), HR, IT (Apulia), AT, PL
<b>Traditional stone walls*</b>	DE, FR, HR	DE (NRW), ES, HR, IT (Apulia)
<b>Others*</b>	DE	
<b>Buffer strips</b>	DE, FR, HR, IT, PL, RO	DE (NRW), ES, FR, HR, IT (Apulia), NL, AT, PL, RO, FI
<b>Agroforestry</b>	DE, ES, FR, IT	
<b>Strips along forest edge</b>	DE, FR, HR, IT, PL	
<b>Short rotation coppice</b>	DE, FR, HR, IT, NL, AT, PL, RO, FI	
<b>Catch crops/green cover</b>	DE, FR, HR, NL, AT, PL, RO	HR, NL
<b>Nitrogen-fixing crops</b>	DE, ES, FR, HR, IT, NL, AT, PL, FI	

Apulia (IT) and Austria have decided to offer equivalent practices to EFA under AECMs, while the Netherlands has introduced certification schemes. In Austria, the condition is to dedicate at least 5% of the beneficiary's arable land to area beneficial for biodiversity, whereas Marche (IT) has decided to consider uncultivated buffer strips and field margins as equivalent practices. **It can be considered that most of the EFA chosen are indirectly or directly beneficial for water related to Member States' choices.**

### Permanent grassland

In 2018, the EU surfaces dedicated to ESPG in Natura 2000 reached about 9.54 million ha (58% of the total permanent grassland) versus 8.17 million ha (50%) in 2015. With the enforcement of the 'Omnibus' Regulation, some Member States have changed the definition of permanent grassland to ensure more areas are eligible for CAP support, e.g. to include pastures where herbaceous forage is not predominant or constituted by shrubs and trees (EL, ES, FR, UK), either on the entire territory (EL, ES) or on specific parts of the territory (FR, UK). Nine Member States (BG, DE, EL, ES, HR, IT, CY, LT, SK) refused to consider grassland ploughed within a period of five years as permanent grassland.

- Permanent Grassland Ratio

Two case-study regions (North Rhine-Westphalia (DE), Alsace (FR)) have decided to establish their permanent grassland ratio at regional level, allowing the most homogeneous distribution of permanent grasslands, whereas all the other Member States and regions have set it at national level. This decision was considered as much less restrictive, because it does not guarantee a minimum threshold at regional level.

- Declared ESPG (outside Natura 2000)

The percentage of declared ESPG on the total permanent grassland area is high in Apulia (IT) (46%), Romania (37%) and Croatia (23%) and significant in four other Member States and regions: Aragon (ES) (17%), North Rhine-Westphalia (DE) (12%), Alsace (FR) (10%) and Poland (10%).

**Hence, the implementation choices of Members States, on permanent grassland, is favourable to water (quality and quantity) with more or less ambitious choices among Member States.**

### Crop diversification

Alsace (FR) is the only case-study region which grants an equivalence scheme to the crop diversification measure that enables maize growers to continue monocropping on condition that the entire arable area is covered by winter soil cover. Maize monocropping most of the time increases water abstraction, as maize is among the more water-demanding crop. It can also be a source of diffuse pollution through increased amounts of fertilisers and pesticides used at the holding level (compared to diversified cropping systems). Therefore, this equivalence may be harmful to water protection compared to crop rotation. Conversely, three Member States (IE, AT, PL) have decided to consider equivalent practices for crop diversification under the Rural Development Programme (M10 AECM), in the form of more demanding crop diversification compared to the standard requirement. Those equivalent practices are favourable for water protection.

Because of the extreme climate events which occurred in Europe between 2017 and 2018 (heavy rainfall, floods, snowfalls and frost), crop diversification derogations were implemented by Member States in 2018 (a) when the sowing of winter crops initially intended to comply with crop diversification requirements in 2018 were seriously affected (DK, EE, LV, LT, PL), and (b) when rainfalls/snowfalls/frost in spring 2018 significantly delayed the sowing of spring crops (IE and UK).<sup>47</sup> Between 2017 and 2019, cutting and grazing was also authorised by means of derogations, on land lying fallow declared for crop diversification for farmers affected by severe drought (2017 – FR, IT, LU, AT, PT; 2018 – BE, DK, FR, LV, PT, PL, SE, FI, 2019: BE, FR, LT, PL, PT).

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<sup>47</sup>Source: "The payment for agricultural practices beneficial for the climate and the environment – greening", Expert Group 15 March 2019



With the implementation of the 'Omnibus' Regulation<sup>48</sup>, simplifications as regards the crop diversification requirements were introduced in 2018: agricultural holdings with more than 75% of their cultivated land in grassland or leguminous plants are now exempted in France and Austria from minimum crop diversification (before 2018, the agricultural holdings whose remaining land exceeded 30 hectares had to comply). As a result, large holdings that were required to have diversified crops on their remaining land before 2018 might now be exempted from this obligation.

**Crop diversification Member States choices are considered to have various effects, but generally less effective than expected, in particular due to numerous derogations leading to less constraining practices with less favourable effects on water.**

### 5.1.3.3 RDP measures implemented to address water issues

The table below presents an overview of the RDP measures relevant for water protection. The implementation of the RDP measures was analysed by considering the planned budgets allocated to Priority 4 and Focus Areas FA 5A, 5D and 5E under these measures for the 2014-2020 period, divided by the national Utilised Agricultural Area. For each measure, a three-colour scale is used to compare RDP measures with relatively low, medium and high planned budget per hectare. It appears that Germany, Italy, Austria and Finland allocated significant budget to water-relevant measures.

**Table 11: Comparison of budgets allocated to Priority 4 and Focus Areas FA 5A, 5D and 5E per RDP measure in case-study Member States**

Group	Type	Name	DE	ES	FR	HR	IT	NL	AT	PL	RO	FI
Pillar II	M1	Knowledge transfer and information actions										
	M2	Advisory services, farm management and farm relief services										
	M4	Investments in physical assets										
	M8	Forest investments										
	M10	Agri-environment-climate										
	M11	Organic Farming										
	M12	Natura 2000 and Water Framework Directive										
	M15	Forest-environment-climate										
	M16	Cooperation										

Sources: AIR data amended in 2019

Legend:

	Relatively low Planned budget / Utilised Agricultural Area
	Relatively medium Planned budget / Utilised Agricultural Area
	Relatively high Planned budget / Utilised Agricultural Area
	No data

According to the interviews, the main RDP measures used by Member States to address water issues are M10, M11 and M4.

**M10 AECM** can support operations which directly target specific water issues. Among case-study Member States, Germany, Italy, the Netherlands, Austria and Finland have dedicated a relatively large budget to this measure, mainly under Priority 4. M10.1 Payments for agri-environment-climate commitments were used to support:

- the creation and maintenance of sustainably managed grasslands or wetlands (e.g. sustainable management of grasslands in DE, FR, AT, FI),
- the maintenance of soil covers for water purpose (e.g. protection of water against erosion and pollution through introduction of winter crops in eroded areas in PL),
- the implementation of specific crop management practices (e.g. stubble ploughing for increased water retention in soil in ES),
- the limitation of phytosanitary and fertiliser products used (e.g. organic fertilisers and mechanical weed control in permanent crops in HR or alternative plant protection for horticulture in FI).

<sup>48</sup> Regulation (EU) 2017/2393

Support under M10.1 was sometimes targeted towards projects located in Nitrates Vulnerable Zones (NRW (DE) and Apulia (IT)) or wetlands (FI).

Germany, Italy, Austria and Finland each planned a higher budget under **M11 Organic farming**. The budget was entirely dedicated to Priority 4. This measure has a direct effect on water quality. Support was primarily oriented towards water sensitive areas (e.g. water catchment areas and Nitrates Vulnerable Zones) in Alsace (FR) and Apulia (IT).

The Member States that set the larger budgets under **M4 Investments in physical assets** to Priority 4 and FA 5A, 5E and 5D are Romania, Italy, Spain and France. In these case-study Member States, a significant share of the budget was allocated to Focus Area 5A for 'Increasing efficiency in water use by agriculture'. Indeed, M4.1 'Support for investments in agricultural holdings' and M4.3 'Support for infrastructure related to the development, adaptation or modernisation of agriculture or forestry' were used to support the modernisation/upgrading of existing irrigation systems on farms, as well as to foster investments in irrigation infrastructure for efficient irrigation. M4.1 was also used to support investments in manure storage facilities or precision farming equipment, thus positively affecting water quality. Article 46 of Regulation (EU) No 1305/2013 applies to all investments in irrigation. Provisions under this Article indicate that investments in an existing irrigation installation must generate a minimum of between 5% and 25% of potential water savings 'according the technical parameters of the existing installation or infrastructure.' Member States must then determine which percentage of water savings is required *ex ante* for the investments to be eligible<sup>49</sup>. M4 'Investments in physical assets' was also used to support non-productive investments linked to the provision of agri-environmental climate objectives (M4.4), e.g. investments in wetlands, investments for buffer zones, hedge plantations, remediation zones in drainage areas, etc. Selection criteria were set to favour investments complying with the National Water Management Plan (AT) or the Water Framework Directive (Aragon (ES)), or located in specific areas facing water issues, such as wetlands and flood zones (FI) or areas with waterbodies with less than good chemical status (Alsace (FR)).

Among case-study Member States, **M12 Natura 2000 and WFD measures** were mainly implemented by Germany and Italy, and to a lesser extent by Spain. These supports aim to grant compensatory payments to beneficiaries suffering from disadvantages due to specific requirements resulting from the implementation of the WFD. It was used in Aragon (ES) for specific agricultural areas identified by the RBMP.

Spain and Italy allocated the largest budgets to **M8 Investments in forest area development**, planned under P4 and FA 5E, which can be used to support afforestation (M8.1). Projects for the creation of drinking-water protection forests were supported in Austria. In Italy, the selection criteria targeted Nitrates Vulnerable Zones (NVZ) and flood-risk areas. **M15 Forest-environment and climate services and forest conservation** was hardly used by the case-study Member States, except Romania (i.e. M15.1 Support for forest-environment commitments involving sustainable forest management that reduces soil erosion).

Other measures with more indirect effect were also used by case-study Members States.

**M1 Knowledge transfer and M2 Advisory services** were mainly implemented in Croatia, Italy, Austria and Finland. Among the overall budget dedicated to P4, FA 5A, 5E and 5D, the highest share was allocated to Priority 4. Examples of water-relevant operations supported in case-study Member States are training for the improvement of water management (FI), the optimisation of the use of agrochemicals (ES, FR, FI), awareness-raising on water-related issues in specific areas targeted by the water boards (NL), vocational training for cross-compliance, AECMs and organic farming (HR), and professional training to improve the sustainability of rural industries (FI).

The budgets allocated to **M16 Cooperation** under P4, FA5A, 5E and 5D by case-study Member States were small. Italy, Austria and Finland were the main users of the measure. M16.1 was notably implemented to support the setting up of operational groups for the improvement of water management

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<sup>49</sup> Member states should fix these percentages depending on the parameters of the existing installation (e.g. higher savings for outdated equipment and lower savings for equipment which is already fairly efficient, etc. Targeting can be achieved through setting (e.g. different minima within a programme according to farm type, geographical area or the need for water savings to reach WFD good status). Another possibility (if only one minimum is fixed in the RDP) is to award extra points through selection criteria to projects aiming at higher potential water savings and in areas where water savings are most needed to reach WFD good status

(ES) and water protection and efficiency (HR), and M16.5 to strengthen horizontal and vertical cooperation between players in the forestry and water sectors (AT).

**Due to their variety and difference in uptake and level of requirements, it is difficult to get a common conclusion for RDP measures. Among the measures with potential direct effect, M8 afforestation can play a significant role in preserving water (e.g. in Spain). Measures with indirect effect (e.g. M1, M2, M16) can also be of significant interest when targeting water issues.**

#### **5.1.3.4 Specific sector support implemented under the CMO Regulation, addressing water issues**

The single Common Market Organisation (CMO)<sup>50</sup> provides tools (e.g. investments in irrigation systems) dedicated to a series of sectors such as fruit and vegetables, apiculture, wine, hops, cotton and olives. Under this regulation, some sectors can benefit from operational programmes (OPs) delivering support to operations involving water management, mostly in the form of investments in irrigation systems.

In almost all case-study Member States, the national strategy for F&V operational programmes includes investment support for efficient irrigation systems. Article 46, fixing rules for investments in irrigation funded by RDPs, does not apply under the CMO regulation. In most cases the emphasis is put on water savings to be achieved through the supported operations. Notably, in Aragon (ES) a minimum of 5% water savings is required for the investments to be eligible. In France, Croatia and Romania, the minimum water savings must reach 15%. Croatia is the only case-study Member State in which the F&V OPs explicitly support operations such as re-use of water, while in Germany OPs focus on improving the quality of water resource (e.g. investments reducing drift and quantity of chemical substances applied on fields). In Member States where water quantity is not a major issue (PL, FI), no specific water-related actions were identified under F&V programmes.

#### **Box 3: Support granted for investment in irrigation systems under the F&V Operational Programmes in Spain**

In Spain, incentive to apply for investment support under the CMO operational programmes (rather than RDP support) is greater, due to higher payment rate and more budget available. Indeed, the payment rate under the F&V OPs is around 50% of the investment, whereas it is set around 40% in the RDP. Moreover, almost all the demands are met under the OPs. To be eligible under the F&V Operational Programmes, Spanish farmers must present a minimum water savings of 5% within five years from the initial consumption level, and metering devices are required. Moreover, the irrigation surface cannot be increased unless the total consumption of water from the holding, including the new irrigated surface, does not exceed the average water consumption of the five years before the investment.

Source: Spanish case-study

National Support Programmes (NSPs) for the wine sector were also implemented under the CMO Regulation. The most important support is the implementation of irrigation in vineyards under the 'restructuring and conversion' measure. In Styria (AT), water-saving technologies are a prerequisite for investments in irrigation systems. In Croatia, activities related to the introduction or improvement of the irrigation system are eligible, including the introduction of irrigation technologies with sustainable water use.

Specific supports granted to the other sectors (hops, cotton and olives) were not mentioned by the stakeholders interviewed in this evaluation.

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<sup>50</sup> Regulation (EU) No 1308/2013

### 5.1.3.5 Use of the Farm Advisory System (FAS) to address water issues

The compulsory FAS covers requirements related to climate change and adaptation, biodiversity and protection of water, by providing regulatory information<sup>51</sup> and to promote efficient water use (on sustainable, low-volume irrigation systems, rain-fed systems), to reduce water consumption and increase water retention. All case-study Member States provide advisory services relating to water protection. These services are provided by different entities according to the Member States, e.g. chambers of Agriculture or Ministries (DE, FR, HR, AT, PL). Advisory services are also provided via the implementation of M2 Advisory services of the Rural Development Programme (ES, HR, IT, AT). In Finland, the FAS is implemented through other specialised organisations.

In Croatia and Italy, cross-compliance advice was identified as essential for dealing with water issues in agriculture. Austria and Poland provide advisory services for farmers involved in AECMs from the RDP. Austria and Germany mentioned advice on the use of pesticides and water protection in protected areas. In Croatia, the FAS also covers water-use efficiency and manure management. In Finland, interviewees reported that animal welfare and water protection measures were the most discussed issues during the farm advisory visits. In Austria, interviewees reported substantial communication between water experts and consultants in agriculture to provide appropriate advices to farmers.

### 5.1.4 MEMBER STATES' IMPLEMENTATION CHOICES OF OTHER CAP INSTRUMENTS AND MEASURES WITH POTENTIAL IMPACT ON WATER QUALITY AND QUANTITY

Member States' choices for the implementation of Pillar I direct payments (including voluntary coupled support) can indirectly affect water, insofar as they support different types of farming, in different regions and various ecological contexts. M13 'Payments to areas facing natural or other specific constraints' can also be implemented to maintain farming systems in the remote and/or hilly areas. The table below presents an overview of the case-study Member States' choices in implementation. A three-coloured scale was used to represent Member States' choices most beneficial for water. The assumption is that a fair distribution of income support, enabled by the implementation of redistributive payment, reduction of payment and uniform level of payment entitlements, can allow farmers with extensive practices beneficial for water protection to remain profitable. The implementation of VCS is expected to support the maintenance of specific sectors having a positive influence on water: protein crops and pulses because they reduce the quantity of fertilisers used, as well as livestock when graze-fed and managed extensively.

**Table 12: Case-study Member States choices for the implementation of direct payments and M13**

Group	Type	Name	DE	ES	FR	HR	IT	NL	AT	PL	RO	FI
<b>Pillar I</b>	Direct payments	Redistributive Payment										
		Reduction of payments										
		National flat rate										
		VCS Protein crops										
		VCS Livestock										
Group	Type	Name	DE	ES	FR	HR	IT	NL	AT	PL	RO	FI
<b>Pillar II</b>	M13	Areas under Natural Constraint										

Source: CATS and ISAMM data

Legend:

RP Reduction of payments National flat rate	VCS	M13
Not implemented	Low level	Low planned budget per Utilised Agricultural Area
Implemented	High level	Medium planned budget per Utilised Agricultural Area
		High planned budget per Utilised Agricultural Area

<sup>51</sup> Article 12 of Regulation (EU) No 1306/2013 mentions that FAS shall cover at least obligations at farm level resulting from the statutory management requirements and the standards for good agricultural and environmental condition of land as laid down in Chapter I of Title VI.

## Implementation of the direct payments (including VCS)

The direct payments ensure minimum income support for farmers engaged in agricultural activities. Basic payments can enable less profitable holdings with practices beneficial for the environment (e.g. highly diversified holdings, extensive grazing systems, etc.) to maintain their existence. However, basic payments can be of different amounts depending on the regions, the Member States and/or the historical level of entitlements, thus favouring specific holdings independently of their practices. The new redistributive payment makes it possible for Member States to increase the payment for the first hectares of the farm and the compulsory reduction of payments principle reduces the payment above a certain threshold.

### **Box 4: Implementation of the redistributive payment, reduction of payments and convergence in case-study Member States**

#### Redistributive payment

The redistributive payment is an important tool for supporting farm holdings of sizes below the national average, since it allows for an additional payment granted to the first hectares. It was implemented in Belgium-Wallonia, Bulgaria, Germany, France, Croatia, Lithuania, Poland, Romania and the UK.

#### Reduction of payments

The degressivity principle has been established at the EU level to reduce the payments granted to very large holdings. The amount cut must be transferred to Pillar II. Among the nine Member States that implemented the redistributive payment, six Member States (BE-Wallonia, DE, FR, HR, LT and RO) have decided not to apply the reduction of payments mechanism. Poland, Bulgaria and the UK (Wales) will grant the redistributive payment while applying the reduction of payments mechanism.

#### Convergence

Internal convergence must ensure that BPS entitlements move towards a more uniform level to ensure better distribution of support within a Member State and between types of farming, or agricultural sectors. To achieve this, Member States can have been able to apply a uniform unit value (flat rate) from 2015 or can achieve the flat rate by 2019. Among case-study Member States, four have chosen to implement a flat rate by 2019 (DE, NL, AT, FI). However, in order to avoid harmful financial consequences for farmers, Member States can also activate a process of internal convergence of payments, which may lead not to a homogeneous value, but to a value close to the payment entitlements at national or regional level (by 2019 no farmer should receive less than 60 % of the national/regional average value). Spain, France, Croatia and Italy have implemented partial convergence.

Source: Agrosynergie (2016)

Subsidiarity was granted to Member States to select agricultural sectors and regions that needed to be supported. The support can be granted only to sectors or regions where specific types of farming or specific agricultural sectors that are particularly important for economic, social or environmental reasons undergo certain difficulties. All EU Member States except Germany applied the VCS. Livestock is by far the main sector supported by VCS, totalling 75% of the total VCS budget in 2016 (42% to beef and veal, 21% to milk products, 12% to sheep and goat), followed by the protein crop sector (10%).

VCSs promote the three livestock sectors (beef and veal, sheep and goat, dairy) in all case-study Member States (except in Austria, where only two of them are supported). The Netherlands' choice to implement VCS in nature areas reduces the risk of livestock support drawbacks. Regarding livestock density, two Member States (FR, RO) have decided to set a limit to the maximum number of animals for the VCS beneficiaries, thereby limiting the harmful effects on water quality from of a too high concentration of livestock units.

Protein crops which are considered as positive for water protection because they contribute to the reduction of the use of fertilisers are supported in Spain, France, Croatia, Italy, Finland and to a large extent in Romania and Poland (26% and 13% respectively of the national VCS). In Ireland and in Luxembourg, the entire VCS allocation has been dedicated to protein crops.

## Implementation of M13 under Pillar II

M13 was established to support farmers located in mountain areas or other areas facing natural or other specific constraints (ANCs), considering the economic impacts arising from the disadvantages on the agricultural activities. Thus, by maintaining these farming systems in the concerned areas, M13 is

indirectly supporting the conservation of water quality and water quantity, by preventing further concentration of the agricultural sector in productive areas. All the studied Member States granted a high budget under Priority 4 to M13 (except NL). Finland and Austria were the main users of M13 per hectare, followed by Croatia and France. In this latter Member State, M13 payments are different according to livestock density, and the level of payment decreased for high density livestock holdings, based on the differences in costs occurred and income foregone compared to the same systems outside of ANC.

### 5.1.5 REPLY TO THE ESQ 1

The overall architecture of CAP instruments and measures targeting the sustainable management of natural resources and climate action with potential effects on water varies significantly between the Member States considered. Under Pillar I, all Member States must dedicate a 30% share of the direct payments budget to greening payments, which represent €23.3 billion spent over the 2015-2017 period at the EU level though payments are not allocated to specific measures. Under Pillar II, nearly €80 billion, i.e. more than 50% of the Pillar II overall budget, was allocated to Priority 4, FA 5A, 5E and 5D, targeting beneficial practices for the environment. Only 14 Member States decided to allocate budget to Focus Area 5A (i.e. €3.2 billion at EU level), which requires increased efficiency in water use by the agricultural sector. As Member States did not distinguish the budget allocated to FA 4B 'Improving water management, including fertiliser and pesticides management' under Priority 4, it is not possible to know which share of the budget was actually targeted towards water-relevant operations<sup>52</sup>.

The set of measures and instruments available to prevent pollutants transfer and improve soil water retention capacity is large and encompasses cross-compliance regulatory instruments as well as voluntary measures of the RDP. The analysis of the checklists established by Member States to check farmer's compliance with GAECs and SMRs shows that Member States usually settle for minimum standards, with few of them really trying to prevent potential bad effects associated with agricultural practices by adding requirements. Notably, the application of pesticides on buffer strips is not banned by some Member States under GAEC 1<sup>53</sup>. Member States intend to provide financial incentives rather than setting regulatory provisions, as highlighted by the considerable budget allocated to water-relevant priorities under M10 AECM and M11 Organic Farming. This also explains why only few Member States implemented M12, which is designed to grant compensatory payments to farmers for applying specific mandatory requirements under the WFD. Indeed, few Member States decided to introduce mandatory requirements under the WFD. M10 AECM, M11 Organic farming and M4 were implemented significantly to foster good agricultural practices beneficial for water quality and quantity. The support granted under those measures was sometimes targeted as a priority towards specific areas facing water issues (e.g. water catchment areas and Nitrates Vulnerable Zones).

The analysis of the measures aiming at maintaining specific land covers beneficial for water quality and quantity shows that GAEC 7 is mainly used to maintain hedgerows and trees in groups and prevent landscape removal. Elements of the green payments under Pillar I are implemented by the case-study Member States in a way that is not constraining for farmers, so as to ensure a minimum basis of sustainable practices (i.e. introduction of N-fixing crops, land lying fallows and field margins, maintenance of minimum levels of crop diversification and permanent grasslands). Equivalent practices in the case of crop diversification measures may in reality lower the restrictions imposed on farmers (e.g. implementation of the certification scheme for maize growers in France) and limit their effect on water.

Member States' decisions to promote efficient use of water mainly consist in supporting investments by farmers in irrigations facilities. Among the Member States studied, Spain, Italy, Romania and France allocated a significant share of the M4 budget towards FA 5A. Furthermore, investment support for

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<sup>52</sup> A detailed assessment of RDPs from the point of view of water management shows that Member States have allocated 51 % of their RDP budgets<sup>13</sup> to measures that, to a greater or lesser extent, relate to water (75 billion euro for the 2007–13 period). In addition, 27 % of the extra funds agreed after the 'Health Check' (approved in 2009 and providing 4,8 extra billion euro) were allocated to the 'water management' priority area (1,3 billion euro).

<sup>53</sup> Unless required under Nitrates Directive, in general this goes beyond what is required by the standard.



efficient irrigation systems is also provided under the operational programmes dedicated to specific sectors in accordance with the single CMO regulation, notably fruits and vegetables and wine.

Finally, the case studies revealed that all Member States rely on their FAS to provide advisory service on water protection to farmers. Notably, specific water-related issues are targeted by the FAS in Austria, Croatia and Germany. The RDP measures to improve farmers' knowledge and promote collaborative actions have not been significantly implemented. Among Member States studied, only Italy and Germany allocated a significant budget under water-relevant priorities and focus areas to M1 and M2. For M16, among the studied Member States, budget was only significantly implemented by Italy.

The Member States' implementation choices of other CAP instruments and measures can lead to potential impact on water quality and quantity. Indeed, basic payments can enable less profitable holdings to maintain practices beneficial for the environment (e.g. highly diversified holdings, extensive grazing systems, etc.). Bulgaria, Poland and the UK (Wales) were considered as the most committed Member States by supporting redistributive payment and reduction of payments in order to endorse small farm holdings, which are presumed as more beneficial for water resources because of their size and diversification. Regarding Voluntary Coupled Support, livestock and protein crops were supported by all the Member States (except DE, NL and AT), with potential benefit for water status depending on the type of livestock farming supported (extensive grazing systems). Two Member States (FR and RO) have decided to set a limit to the maximum number of animals eligible under VCS, therefore limiting the harmful effects on water quality of a too high concentration of livestock units. The analysis of AIR data revealed that a high level of budget was planned under Measure 13 in Finland, Austria, Croatia and France. This choice can be of interest for water, insofar as a certain type of livestock farming located in ANC is supported and provided that direct access of animals to water bodies is prevented.

## **5.2 CAUSAL ANALYSIS – ESQ 2: WHAT ARE THE DRIVERS AND REASONS BEHIND THE IMPLEMENTATION CHOICES REGARDING THE CAP INSTRUMENTS AND MEASURES DIRECTLY AND INDIRECTLY RELATED TO WATER:**

- A. at the level of the Member States and/or regional administrations in terms of CAP instruments and measures and their design, taking into account the range of possibilities for setting compulsory and facultative elements in the requirements for farming practices?**
- B. at the level of beneficiaries (farmers/foresters) in terms of land use patterns, intensity of land use, and geographical distribution of production?**

In answering these questions, the degree of importance of the different drivers should be considered.

### **5.2.1 UNDERSTANDING OF THE QUESTION AND METHODOLOGICAL APPROACH**

This context-setting question seeks to gain insights about the reasons for the implementation decisions that have been made with respect to instruments and measures related to water, both by Member States and beneficiaries. There is indeed a range of flexibilities opened to Member States, as described in ESQ 1. From farmers' and foresters' perspectives, there are also a number of choices that can be made regarding how to implement the required farming practices and what instruments or measures to choose. Understanding the rationale for their choices reveals the weight associated with environmental and climate priorities and other factors such as production effects, significance of the change in the management practices, etc. Compliance with some regulatory requirements, the WFD for instance, can also be a driver of choices. Finally, the rules under which payments are administered and verified can also potentially impact the choices of both Member States and farmers.

Information on the drivers and reasons behind the implementation choices of Member States were gathered through a literature review, supplemented with in-depth interviews with government officials and stakeholders involved in the institutional process in each case-study Member State. Farmers' representatives and environmental stakeholders were consulted to obtain information on the drivers influencing the decisions made.

In-depth information on the drivers behind the beneficiaries' decision concerning measures related to water was collected from a survey with farm advisers carried out in case-study Member States. Then, interviews with stakeholders in the case studies examined whether farmers had been appropriately informed about the possible choices available to address water issues and to comply with the EU requirements. The information collected in the case studies has been complemented using FADN

analysis to determine whether land use patterns, intensity of land use and geographical distribution of production influenced the choices of farmers to implement water-related measures.

## **5.2.2 SPECIFIC WEIGHT ALLOCATED TO THE WATER QUANTITY AND QUALITY ISSUES BY MEMBER STATES WHEN DESIGNING THE CAP INSTRUMENTS AND MEASURES**

The 'Mapping and analysis of the implementation of the CAP' study (2016) revealed the significant weight of economic and historical drivers behind the overall strategy and implementation choices made by the Member States, and this finding was confirmed by the evaluation of greening measures (Alliance Environnement, 2017c), which showed that environmental and climate objectives had generally not been a major factor in the implementation choices made by Member States in relation to greening. Although some exceptions exist, implementation decisions regarding the greening measures had been driven mainly by administrative issues and minimal disturbance to 'normal' farming practices.

However, considering water issues, interviews revealed that the need to reduce the agricultural pressures had been considered for the design and the implementation of the Pillar II measures in case-study Member States, aside from other relevant needs at regional/national level.

It is to be noticed that, during case studies, no specific elements were collected on the range of possibilities for setting compulsory and facultative elements in the requirements for farming practices.

### **5.2.2.1 Water authorities involved in the RDP design in case-study Member States**

In all case-study Member States, one or more authorities related to water were associated with the RDP in the design and implementation process, e.g. the department of the Federal Ministry for Environment responsible for water management and water protection, as well as the department of the Chambers of Agriculture responsible for advice on water protection, were included in the planning process of the RDP in North Rhine-Westphalia (DE). However, a lack of equity in the consideration of views from the different stakeholders was reported, e.g. in Romania, where it was reported that the Ministry of Agriculture and Rural Development did not sufficiently communicate and consult with the national water agency on water issues. In Croatia, representatives of small farmers and environmental associations were underrepresented, whereas a large majority of the RDP Monitoring Committee was in favour of high-input, intensive agriculture.

### **5.2.2.2 Availability of updated information sources on the water issues**

The consideration of water in the implementation choices of Member States is generally supported when updated information sources on the water issues at stake are available. For instance, in Spain, the stakeholders interviewed stated that the design of the CAP was influenced by the Commission document '*Position of the services of the Commission on the development of the Association Agreement and of programmes in SPAIN in the period 2014-2020*,' which pointed out the main challenges of water management. In the Netherlands, the water boards greatly influenced the design of the RDP for the targeting of water issues. In Alsace (FR), an inventory on the quality status of the groundwater supported by the region and the water agency also highlighted the need to address water contamination by herbicides used by maize growers.

The parallel elaboration processes of the RDP and the RBMP in Finland, involving water-related stakeholders, was also mentioned as an important driver of the successful consideration of water management issues in the RDP.

### **5.2.2.3 Relative weight of the various drivers**

The involvement of water authorities in the design process of the RDP did not systematically lead to the consideration of water issues in the studied Member States. In following Member States, water issues were successfully defended by water-related stakeholders and taken into account in the design process. In Aragon (ES), Apulia (IT) and Romania, irrigation and sustainable access to water during drought periods were core issues considered in the building of the RDP. In France, economic issues were also of importance; however the water agency contributed to design and funding of water-oriented measures (AECM and M4.3) in the RDP. In the Netherlands, the support of the water boards and the context (non-



fulfilment of the WFD objectives, farmers' union involvement on the water topic, etc.) helped setting the focus on water issues.

According to the stakeholders interviewed, water issues were not particularly considered in the design of the RDP in three out of the ten studied Member States. In North Rhine-Westphalia (DE), the environmental focus of the RDP was oriented towards biodiversity rather than water. In Poland, water issues were addressed to some extent, but the role agriculture could play in the protection and management of the water resource was not sufficiently taken into account. In Croatia, the focus was put on competitiveness, and the environmental requirements of the CAP (i.e. cross-compliance, greening measures) are perceived as obstacles overall.

The importance of making strategic choices due to the limited EAFRD budget was also pointed out as a driver of choice in Alsace (FR) and Poland, whereas budgetary conflicts in the design process were mentioned in Aragon (ES) and Apulia (IT).

### **5.2.3 MOTIVATIONS DRIVING BENEFICIARIES TO IMPLEMENT WATER-RELEVANT MEASURES**

The motivations of farmers to implement the CAP measures have been examined through a survey for the main water-relevant CAP instrument and measures (greening measures and RDP measures M10 AECM, M4 Investments support and M11 Organic support) generally implemented by Member States to address water issues.

However, as a pre-condition for farmers to implement these measures, adequate information must be granted on the impact of farming practices on water, the different measures available under the CAP and their potential contribution to address the water issues.

#### **5.2.3.1 Adequate information about the possible choices of implementation and their potential impact on water quality or quantity**

Depending on the Member State, specific information related to the protection of water was provided to farmers via the FAS or other organisations. In Alsace (FR), advisers from the water agencies or professional organisations of organic farmers raise farmers' awareness on water issues and available CAP support to implement beneficial practices. In some Austrian provinces, a special consulting service for water aims at reducing emissions into water bodies. In Aragon (ES), a region with high irrigation needs, the information on sustainable management of water is not provided via the FAS but via the Irrigators' Communities.

In five Member States (DE, FR, HR, AT, PL), the farm advisers surveyed answered that farmers were adequately and sufficiently informed about the possible choices of implementation and the potential impact on water of the water-relevant CAP instruments and measures. In Italy, Poland, Romania and the Netherlands, the survey revealed that farmers were insufficiently informed about the implementation choices available under the AECMs and corresponding impact on water<sup>54</sup>.

In Poland and Romania, the stakeholders interviewed during the case studies indicated that there are not enough farm advisers to meet demand. However, all farmers subscribing to the AECM have access to advisory services. In Romania, there is currently no coherent FAS, and the gap in the advisory system is sometimes filled by the Paying Agencies. However, in all four Member States the information on investment support was sufficient.

In Finland, information on the AECMs has been disseminated, but the farmers' representative interviewed highlighted that few beneficiaries know how the implemented measures influence water quality in practice.

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<sup>54</sup> In the case of the Netherlands, this answer is surprising considering the innovative approach used for the implementation of the AECM. Indeed, AECMs are managed through a collective approach<sup>54</sup> which, according to the interviewees of the case-study, results in a good uptake of the AECMs. This low uptake may be explained by a misunderstanding of what was concerned by AECM among the surveyed advisers.

### 5.2.3.2 Relative weight of the various drivers behind beneficiaries' choices

Farm advisers were surveyed on the drivers leading farmers to implement the main water-relevant CAP instruments and measures. The first driver for the implementation of greening measures, M10 AECM, M11 Organic farming and M4 Investments are economic reasons in most case-study Member States. Compliance with new standards was also mentioned as the second reason for the choice of the investments measure (notably in AT, HR and IT). The environmental and climate motivations were also highlighted as an important driver for the choice of M11 Organic farming, M10 AECM, and the implementation of M4 Investments (notably in FR and PL).

The interviews carried out in case-study Member States tend to confirm that M4, M10 and M11 can help farmers to adapt to new standards and/or increase their productivity (e.g. increase farm efficiency through improved irrigation systems (HR, IT), adapt the production to the market demand and increase added value (AT, DE, ES, FI, FR, RO), etc.).

Stakeholders in some Member States (FR, DE, AT and NL) also mentioned that one of the factors which drove farmers' choices to implement measures with intended effects on water is their heightened awareness on the impact of agricultural practices on water and the role agriculture could play in the protection of water. Finally, improving water-use efficiency and saving water, especially in regions facing water scarcity (ES, IT, RO), is also a significant driver.

In Aragon (ES), social drivers influencing the implementation of measures supporting the modernisation of the irrigation systems were also highlighted, i.e. high demand for young farmers with training and professional experience outside the agricultural sector; influence of the local community driving farmers' choices (e.g. top-down effect: promotion of the modernisation by the General Communities of Irrigators, and snowball effects: the modernisation in one community favours modernisations in the others. This social dynamic is also mentioned in the Netherlands as an important driver, as well as the collective approach implemented. The fact that neighbours get involved in RDP measures has a snowball effect and influences farmers from the same area in their choice of water-related measures.

### 5.2.3.3 Influence of land use patterns, intensity of land use, and geographical distribution of production on the implementation choices of beneficiaries

Rural Development measures M10, M11 and M4 were highlighted by the Managing Authorities as the most relevant measures implemented to target water issues. The interview results confirm that farm characteristics will influence the uptake of the water-relevant measures (and notably M10 AECM). For example, it was mentioned that water-relevant measures are less attractive in regions with highly intensive farming systems facing water problems (AT, DE) and that farmers involved in highly profitable farming systems are less inclined to change their practices (e.g. maize growers in Alsace (FR) and very intensively operating companies in Austria or North Rhine-Westphalia (DE)).

The geographical situation was also mentioned as a driver in the choice of the water-relevant measures by farmers. This is the case in Poland, where the presence of NVZs or Natura 2000 areas influences farmers' choice<sup>55</sup>. In Aragon (ES), farmers located in regions with more potential for yield increase are more interested in modernising their irrigation systems. In Finland, some farms have land suitable for implementing wetlands and can apply for the specific measure M10.1.11 Management of wetlands.

The information collected in the case studies was crosschecked with the FADN analysis in order to determine whether land use patterns, crop profitability and/or geographical distribution of production influenced the choices of farmers to implement water-relevant measures. The assessment could determine whether the water-related measures were more or less used by farmers according to:

- geographical distribution (i.e. inside ANC/outside ANC);
- type of agricultural holdings (i.e. main production and UAA);
- farm income (i.e. income per hectare); or
- farm practices (i.e. arable crop diversification).

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<sup>55</sup> In the Polish RDP, a specific measure targets these farmers, i.e. M4 Investments in farms located on NATURA 2000 and NVZ, which supports investments related towards meadows and grasslands used for grazing livestock.

### Influence of the geographical distribution of farmers in and out of Areas with Natural Constraints (ANC)

The percentage of farmers who chose to implement M10<sup>56</sup> or M11 is higher in ANCs. This might be explained by the need for farmers located in ANCs to look for extra added-value/additional sources of income. This is particularly true in Germany, Finland and the Netherlands, where a greater proportion of farmers having implemented M10/M14 are located in ANCs. The same pattern is observed for the choice of M11, notably in Germany and Finland. However, location in ANCs does not seem to significantly influence the choice of implementing M4.1 and/or M4.3.

### Influence of farm types

According to the FADN analysis, the percentage of farmers who chose to implement AECMs is higher in the livestock sector, among farmers specialised in grazing livestock (i.e. cattle, sheep/goats), dairy farms and mixed holdings. In other sectors (field crops, wine, permanent crops), the subscription rate varies among Member States. However, it is very low in the horticulture sector<sup>57</sup> (except in AT and FI).

M11 is generally implemented more by farmers growing permanent crops other than vineyards, and by those rearing grazing livestock (especially in FI with 28.5% and 36.2% of farmers implementing the measure in these two farm types respectively). In France, the rate of farmers from the horticulture and wine sectors having implemented M11 is higher than in other Member States. At the EU level, the horticulture farms and the pig and poultry farms are those with the lowest percentage of farmers having implemented M11 in most of the Member States.

Austria, France and Finland register higher percentages of farmers having implemented M4.1 and/or M4.3. In these Member States, the holders of farms specialised in permanent crops (other than vineyards) were the main users of the investment measure (except in FI where no tree crops are grown), followed by farmers from the wine and the dairy and livestock sectors. In other studied Member States, the percentage of farmers who chose to implement M4.1 and M4.3 is very low for all farm types.

### Influence of the size of the Utilised Agricultural Area (UAA)

In most of the studied Member States (AT, ES, FR, FI, HR, IT, NL, PL), the higher the UAA, the higher is the percentage of farmers having implemented M10 (and/or M14). This tendency is more or less significant among the Member States.

No clear pattern shows up from the FADN analysis concerning the influence of the UAA on the choice of M11 by farmers. In three Member States studied (DE, FR, PL), the percentages of farmers having implemented M11 decreases when the size of their UAA increases. Further, in Spain, Finland and Croatia, the percentage of farmers having implemented this measure is higher among farmers of medium and large UAAs.

Except in France and Austria, the percentages of farmers having implemented M4.1 and M4.3 are slightly higher among categories of farmers with medium/large UAAs. However, the usage rate remains relatively low in the studied Member States, with a maximum rate around 11% in Finland for farmers with very large UAAs.

### Influence of income

For M10, as well as for M11, FADN analysis indicates that there is no influence of farm income level on the choice of farmers to implement the measure. Indeed, the percentage of farmers is approximately the same in the different categories of income in each Member State.

However, a slight tendency was found in Germany and Finland, where the lower the farm income, the higher the percentage of farmers implementing M10 (and/or M14). Similarly, the percentage of farmers implementing M11 is slightly higher for farmers with the lowest income in Germany and in Poland (respectively 8.5% and 3.8%).

Despite the general low level of farmers having implemented M4.1 and/or M4.3 at the EU level, the FADN analysis revealed that farmers with higher income are more inclined to apply for investment support under M4.1 and M4.3 (NL, PL, FR, ES, DE, AT).

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<sup>56</sup> The FADN provides data for beneficiaries of M10 (AECM) and/or M14 (Animal welfare). It was thus not possible to distinguish whether the percentage of farmers identified were beneficiaries of M10 or M14 or both measures.

<sup>57</sup> Which is among the ones using the most inputs.

### Influence of the crop diversification level

In the case-study Member States, the percentage of farmers having implemented M10 (and/or M14) is higher among farmers with more than four crops (except in France, where no specific influence of the level of crop diversification is noticed). The percentage is also high among farmers not growing crops (or possibly growing permanent crops, according to the FADN), except in Croatia and Poland.

It appears that farmers with one or two crops are slightly more inclined to implement M11 (FR, FI, HR). This can be explained by the fact that farmers are looking for higher added-value crops<sup>58</sup>. Then, growers of permanent crops were more interested in implementing M11 in Germany, Croatia and Italy.

In France and Austria, there are higher percentages of farmers with permanent crops and farmers with one to two arable crops having implemented the investment measures M4.1 and M4.3. No specific tendency regarding the influence of crop diversification level on farmers' choice of these measures was noted in the other Member States studied.

## **5.2.4 REPLY TO THE ESQ 2**

The drivers behind the implementation choices of the CAP framework differ among Member States. As already documented by previous CAP evaluations, many of them considered economic, administrative and historical factors first. Cross-compliance<sup>59</sup> and the greening measure were implemented to enforce the mandatory environmental practices required by regulations (EU) Nos 1306/2013 and 1307/2013 and to avoid major economic and technical disturbances, with different levels of ambition with regard to environmental objectives (also see ESQ 1).

The environmental issues were taken into account and addressed during the design process of the RDP. As stated by the stakeholders interviewed, the need to alleviate agricultural pressures affecting water quantity and/or quality was targeted by RDP measures in all case-study Member States. The involvement of water authorities in the elaboration of the RDPs, with sometimes the co-funding of RDP measures by such water authorities, played a significant role in the implementation of voluntary measures helping farmers to implement beneficial practices for the protection of the water bodies. Another driver that contributed to the consideration of water issues by the RDP is the concomitant elaboration of the RBMP, as similar stakeholders can be involved in the design process of both documents (as seen in the case of Finland). The readiness and availability of this strategic document helps Managing Authorities in identifying the water quality and quantity issues and the measures needed locally to address them.

Following the assessment, the consideration of environmental issues (in particular water and climate) is increasing, even though economic issues and budget allocation of RDPs were mentioned by the interviewees as other main drivers concerning the choices made by the Managing Authorities.

The main drivers leading farmers to implement the water-relevant RDP measures (M4 Investments support, M10 AECM and M11 Organic farming) remain economic reasons for all four measures. The need to comply with new standards was mentioned as a second driver as regards the investment support, whereas the farm advisers surveyed indicated that the environmental and climate motivations was the second reason pushing farmers to implement organic farming and AECMs.

Raising awareness of farmers on the impact of agricultural practices on water appears to be an important driver in the change of practices. According to the interviews, most of the case-study Member States deliver adequate advisory services to the farmers in that respect. However, in the opinion of farm advisers, water-related information on AECMs and organic support could be improved in some of the studied Member States.

The FADN analysis revealed that the geographical and economic factors also influence the choices of beneficiaries. Notably, M4 Investments support was usually used more by farmers with high income and large UAAs in the case-study Member States, whereas the M10 AECM beneficiaries were mainly livestock breeders (grazing livestock, dairy farms and mixed holdings), growing more than four crops and having

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<sup>58</sup> This hypothesis is nonetheless not confirmed by the analysis of the influence of the UUA size.

<sup>59</sup> SMRs under cross-compliance are implemented to (better) enforce what is already required under the environmental or health regulation. GAECs and greening measures by themselves introduce requirements. They do not enforce requirements established elsewhere as for SMRs.

large UAAs. The beneficiaries of M11 appear to be more diversified according to the Member States studied and are mainly growers of permanent crops or livestock breeders. It was pointed out during the interviews that water-related measures are less attractive for highly intensive farming systems, which are generally located in regions facing water problems (AT, DE, FR). Indeed, the payment rate is not sufficient to offset the opportunity costs associated to the implementation of the practices supported by these farming systems.

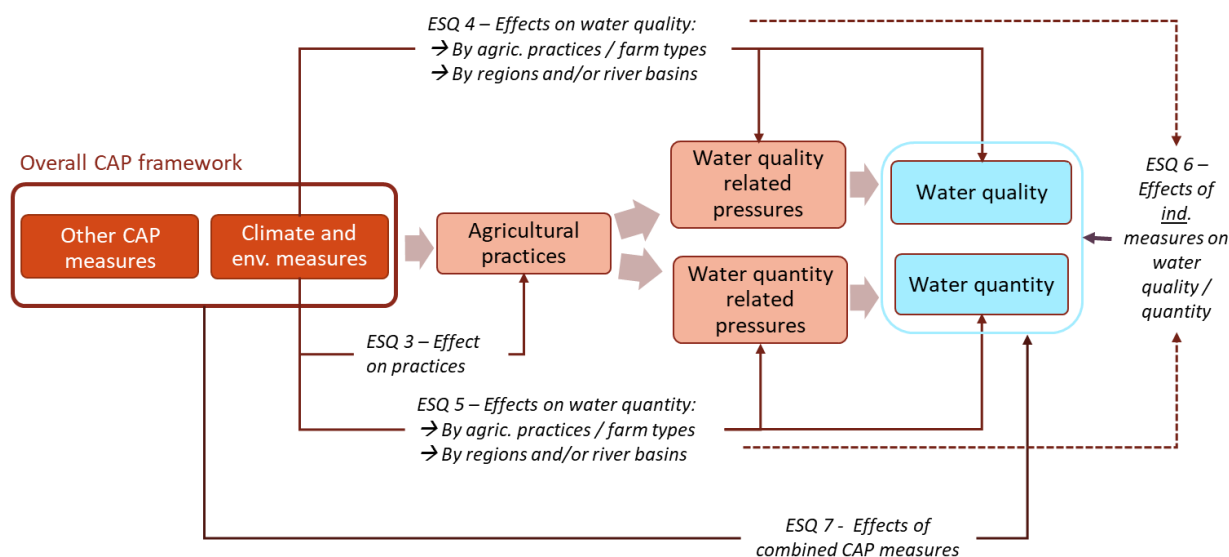
To conclude, the drivers behind the implementation choices of the CAP framework differs among Member States, but they are mostly economic drivers, whereas environmental objectives were secondary. Also, Member States often prefer voluntary measures than compulsory ones.

### 5.3 EFFECTIVENESS ESQs 3 TO 7 – OVERALL METHOD TO ASSESS CAP EFFECTS ON WATER

ESQs 3 to 7 ask about the extent to which the CAP instruments and measures have positively or negatively affected water quality and/or quantity. Whereas ESQ 7 considers the effects of all the CAP instruments and measures combined, ESQs 3, 4, 5 and 6 focus on CAP instruments and measures addressing sustainable management of natural resources and climate action (see Figure below). Such measures have been identified earlier in this report in the introductory chapter and in the ESQ on causal analysis. These are the greening payments, GAECs, SMRs, FAS, sector-specific measures of the operational programmes set under Pillars I<sup>60</sup> and M1, M2, M4, M8, M10, M11, M12, M15, M16 and Leader under Pillar II.

As depicted in the graph below, ESQ 3 examines the effects of the CAP measures and instruments on farmers' practices beneficial for water. ESQ 4 and ESQ 5 look at the pressures on water that arise from farmers' practices, i.e. the extent to which the CAP measures and instruments have affected water abstraction, fertiliser and pesticide transfers to waters, and bank alteration, etc. by farmers. As far as possible, they distinguish the effect of the CAP measures on the pressures affecting water quality and quantity respectively. ESQ 6 then provides a summary of results from ESQ 3 to 5 to assess the individual impact on water of the CAP measures addressing the sustainable development of natural resources and climate action. Finally, ESQ 7 treats the impact of the CAP as a whole on water quality and quantity. It combines the results of ESQ 6 with the results of a new analysis on the effects of the measures that do not address the sustainable management of natural resources and climate action but have indirect (positive or negative) effects on water.

**Figure 12: Scope of ESQs 3-7**



<sup>60</sup> Specific measures of the POSEI dedicated to outermost regions as well as similar instruments dedicated to the Small Aegean Islands are not dealt with in this report, which focuses on mainland EU.

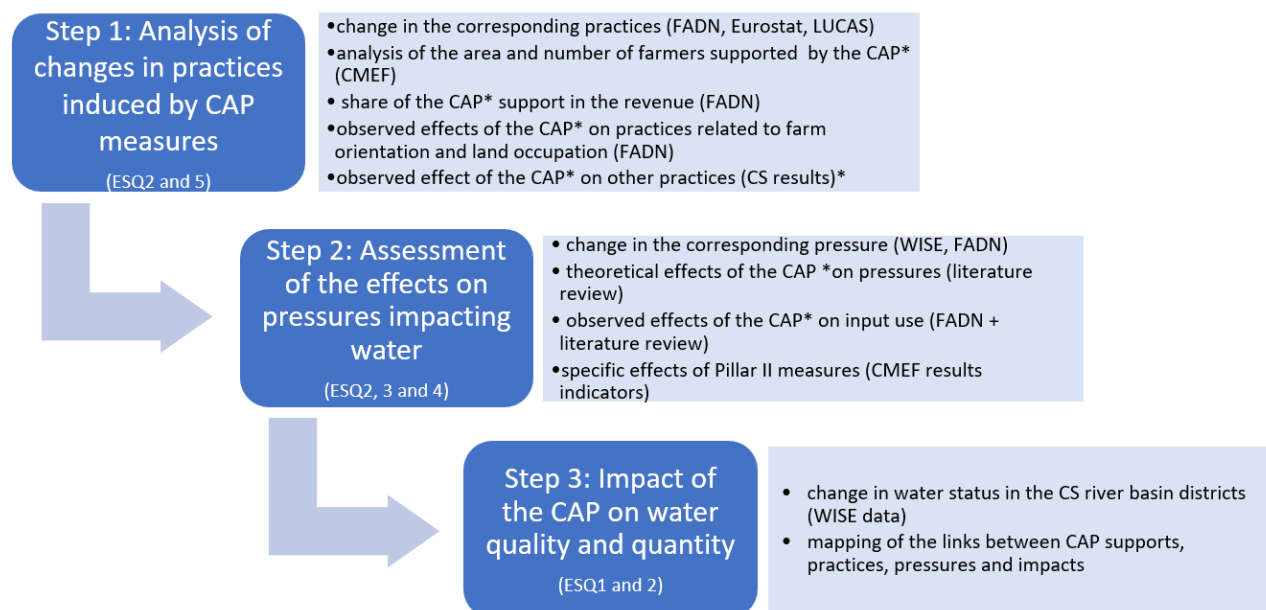
Source: Alliance Environnement compilation

The method for the assessment of the CAP effectiveness for ESQ 3 to 7 follows a three-step approach:

- Analysis of the positive or negative effects of the measures on agricultural practices relevant for water protection;
- Assessment of the effects of these changes of practices on the pressures related to water;
- Estimation of the extent to which these pressures had a positive/negative impact on water quality and quantity (it is assumed that these impacts could not yet be observable).

The graph below presents the overall method used to answer the effectiveness ESQs. It is applied for each type of CAP measure/instrument examined, and concerns both water quality or quantity.

**Figure 13: Main steps, analysis and data sources and ESQs concerned**



\*Analysis provided for both Pillar I and Pillar II

Source: Alliance Environnement

## 5.4 EFFECTIVENESS - ESQ 3: TO WHAT EXTENT HAVE THE CAP INSTRUMENTS AND MEASURES ADDRESSING SUSTAINABLE MANAGEMENT OF NATURAL RESOURCES AND CLIMATE ACTION CONTRIBUTED TO INCREASE OR ALLEVIATE PRESSURES FROM FARMING PRACTICES ON WATER RESOURCES IN TERMS OF A) QUALITY (INCLUDING FERTILISER AND PESTICIDE MANAGEMENT) AND B) QUANTITY (ABSTRACTION, FLOOD RISK, ETC.)?

***N.B. Only the effects of the measures targeting the sustainable management of natural resources are considered here. The global effects of the whole CAP framework are assessed in ESQ 7.***

### 5.4.1 UNDERSTANDING OF THE QUESTION AND METHODOLOGICAL APPROACH

This question considers the extent to which the CAP measures and instruments have generated changes in agricultural practices affecting water. The analysis will consider the changes brought about by the CAP instruments and measures on:

- farm system implemented, as well as the crop and livestock type of management, e.g. level of input use, cropping system, density of livestock, cultivation practices, maintenance of landscape features, etc.;
- land-use practices at farm level, e.g. grassland areas, afforestation, diversification level, non-productive area such as field margin, etc.;
- water quantitative management by farmers, i.e. development of irrigation infrastructure and suitable equipment for efficient use of water, water reuse, introduction of plants with lower water



needs, increased water-retention capacity for soil, etc.;

- the level of farmers' knowledge and awareness on water issues and their impact of agricultural practices.

For each CAP instrument/measure with the specific objective of improving the sustainable management of natural resources and climate action, the effect on agricultural practices was assessed based on a two-level scale, considering:

- the uptake of the measure or instrument (e.g. percentage of farmers or area concerned);
- its level of requirement regarding the introduction of practices beneficial for water.

According to the degree of contribution to the objective of improved management of water quantity and quality, a score from 1 (low) to 3 (high) was assigned to each criterion. The overall effectiveness of the measure was then assessed by multiplying the scores granted to the two criteria.

This analysis is based on the triangulation of the information available from different sources of data: the CMEF output indicators, the FADN database, the farm advisers' survey and case-study interviews carried out for this evaluation. The CMEF output indicators are available by priority (for Priority 4) and Focus Area (for the other Priorities).

#### **5.4.2 EFFECTS OF CAP INSTRUMENTS AND MEASURES ON CROP, PLOT AND LIVESTOCK MANAGEMENT PRACTICES AFFECTING WATER RESOURCES IN TERMS OF QUALITY AND QUANTITY**

A series of CAP instruments and voluntary measures support the implementation of sustainable agricultural practices. The GAECs and SMRs ensure a solid basis by requiring minimum practices that play a direct role on water quality and quantity aspects. In addition, the RDP provides measures that go beyond the regulatory framework, to support farmers and help them implement/maintain beneficial practices for water resources (e.g. use of machinery limiting soil compaction, minimal soil cultivation, incorporation of crop residuals, support to improve manure management, reduction of inputs, etc.).

##### **5.4.2.1 Farm advisers' opinion**

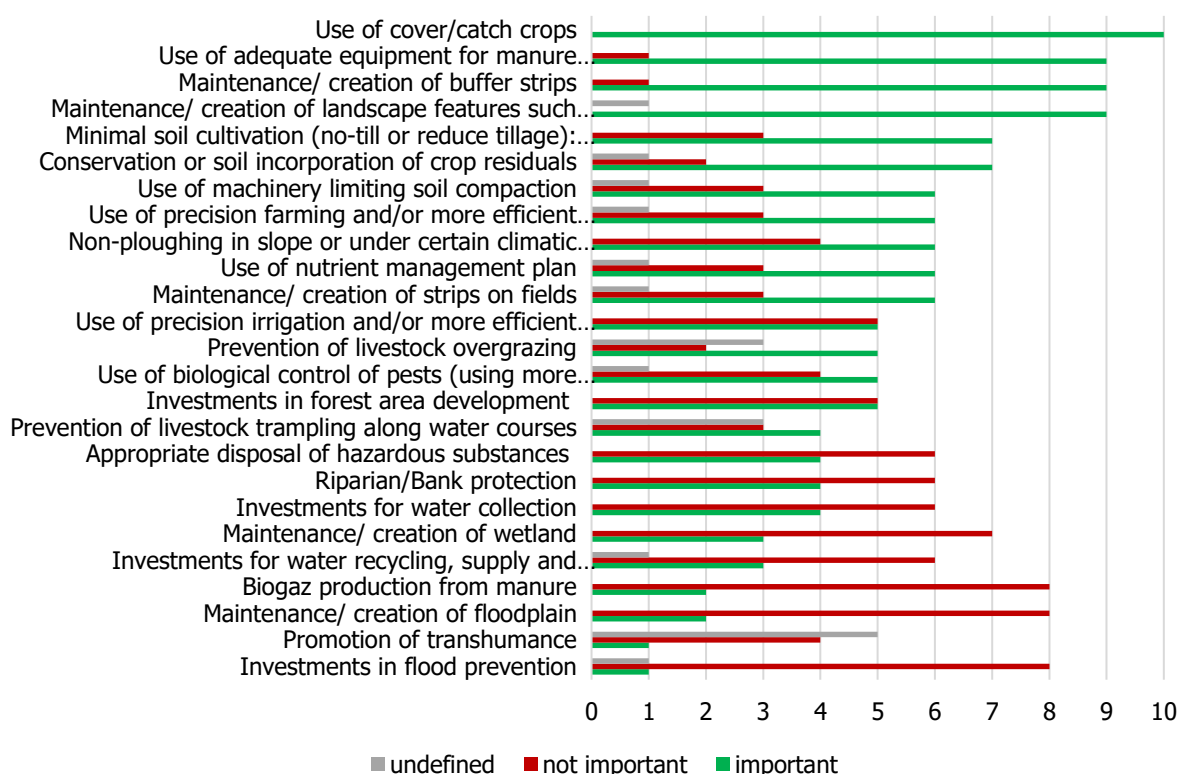
The figure below shows the extent to which the CAP supported practices beneficial for water protection in case-study Member States, based on the answers of farmer advisers and representatives surveyed. It reveals that the CAP was identified as an important factor in more than half of the case-study Member States to explain the following:

- The **use of cover and catch crops** - especially cross-compliance, greening measures and RDP measures related to knowledge transfer, advisory services and cooperation.
- The **use of suitable equipment for manure management** - especially cross-compliance, RDP measures supporting investments and related to knowledge transfer, advisory services and cooperation.
- The **maintenance or creation of buffer strips** - especially cross-compliance and greening measures but also RDP measures supporting investments in Italy and RDP measures supporting specific land use and land-use change in Finland (e.g. M8, M10, M15).
- The **maintenance and creation of landscape features** - especially cross-compliance, greening measures and RDP M11 for organic farming, but also RDP measures supporting investments in IT and RDP measures supporting specific land use and land-use change in NL (e.g. M8, M10, M15).
- The **development of minimal soil cultivation** - especially cross-compliance, greening measures, RDP M11 Organic farming but also RDP measures related to knowledge transfer, advisory services and cooperation in Austria.
- The **conservation or soil incorporation of crop residuals** - especially cross-compliance, greening measures, M11 Organic farming and other RDP measures related to knowledge transfer, advisory services and cooperation.
- The **use of machinery limiting soil compaction** - especially, cross-compliance, RDP investment measures and measures related to knowledge transfer, advisory services and cooperation.
- The **use of precision farming and more efficient equipment to manage fertilisers and pesticides** - many different measures were mentioned depending on the Member States considered, for instance cross-compliance in HR, IT and DE, RDP investments measures in AT, IT

and NL or RDP measures related to knowledge transfer, advisory services and cooperation in AT, HR, NL and DE.

- The **absence of ploughing on slope or under certain conditions**: especially the cross-compliance measure.
- The **use of nutrient management plans**: especially cross-compliance and M11 Organic farming.
- The **maintenance or creation of strips in fields**: especially cross-compliance, greening measures and M11 Organic farming.

**Figure 14: Importance of the CAP instruments and measures to explain changes in practices in case-study MS (most frequent answer per MS)**



Source: Alliance Environnement, from Survey results

#### 5.4.2.2 Regulatory and mandatory CAP instruments and measures affecting crop, plot and livestock management

The greening measures and cross-compliance rules require farmers to comply with specific practices to receive CAP support (i.e. direct payments, but also RDP support and CMO sector-specific support in the case of cross-compliance). All farmers receiving CAP support are subject to cross-compliance, whereas greening measures concern only farmers eligible for basic payments under Pillar I (see box below). Hence, the percentage of farmers subject to these regulatory tools is significant but varies according to the Member States.



### Box 5: Sectors not eligible for direct payments

Following the 2003 reform and the decoupling of CAP support, the Member States could decide to allocate area-based entitlements to support farmers under direct payments, by implementing either the regional or historical model. In Member States implementing the historical model, specific agricultural sectors (e.g. fruits and vegetables, wine) did not benefit from direct payments entitlements. However, farmers of these sectors were supported in other Member States having applied the regional models (European Commission, 2011). When they were excluded from direct payments, those sectors were consequently not forced to comply with GAEC and SMR rules<sup>61</sup>, e.g. areas dedicated to small-scale olive production in Greece and to horticulture in the Netherlands, and areas cultivated by Slovenian farmers in Austria are concerned (European Court of Auditors, 2008).

Whereas the 2013 CAP reform proposed to extend the list of eligible farmers to direct payments, some Member States decided not to consider it. As presented in the table below, among the eight Member States concerned, three of them decided to make no change to any of the non-eligible sectors (FR, PT, UK-NI).

**Table: Member States having decided to extend or not the list of eligible farmers for the following producers in 2013**

Member States	Fruit producers	Vegetables producers	Ware potatoes producers	Seed potatoes producers	Ornamental plants producers	Cultivated vineyards producers
DE	NO	NO	NO	NO	NO	YES
IE	YES	YES	YES	YES	NO	NO
EL	YES	YES	YES	YES	NO	YES
FR	NO	NO	NO	NO	NO	NO
MT	YES	YES	YES	NO	NO	YES
PT	NO	NO	NO	NO	NO	NO
SI	NO	NO	NO	NO	NO	YES
UK-NI	NO	NO	NO	NO	NO	NO

Source: European Commission (2016)

Source: Alliance Environnement, based on literature review

Cross-compliance and greening measures ensure the implementation of minimum standards beneficial for water among eligible farmers. Non-conformity with the requirements under the greening measures or cross-compliance exposes farmers to penalties. Breaches under cross-compliance may lead to a reduction of up to 5% of direct payments, whereas breaches under the greening requirement may lead to partial to total reduction of the greening payment (which represents 30% of the direct payments). In that respect, greening measures are more coercive than cross-compliance rules.

### Ecological Focus Area

In the table below, the level of uptake represents the share of the UAAs under EFAs in case-study Member States. Besides overall objective of biodiversity, some of the EFA elements directly target or consider improved water management, with positive effects on both water quality and quantitative management, i.e. buffer strips, strips along forests, catch crops and nitrogen-fixing crops. The analysis of the effectiveness considers the share of land under these EFA elements. In the table below, the requirement score is 1 if share is <5%, 2 when between 5% and 10% and 3 if >10%.

The most widely implemented EFAs is catch and cover crops, which account for 51% of the declared areas. The evaluation of the greening payments (Alliance Environnement, 2017) shows that the EFA measures can partly explain the increase of catch and cover crops observed over the period, even if this practice was already quite used in Nitrate Vulnerable Zones. Since this evaluation, it should be noted that the percentage of EFAs covered by catch and cover crops decreased, a situation which may be due to the ban of pesticides introduced in 2018.

<sup>61</sup> SMR rules apply to farmers not eligible to direct payments. MS have to enforce these rules outside the CAP framework, i.e. no penalties assigned to non-compliant farmers under the CAP direct payments.

**Table 13: Assessment of the effects of EFAs (greening)  
on water quality and quantitative management**

Score indicator	DE	ES	FR	HR	IT	NL	AT	PL	RO	FI
Uptake (% UAA under EFAs)	3	3	3	2	2	2	1	2	3	1
Requirement (% of land under EFAs improving water management)	2	0	2	1	1	3	1	2	1	0
<b>Effectiveness (quantitative and qualitative)</b>	<b>6</b>	<b>0</b>	<b>6</b>	<b>2</b>	<b>2</b>	<b>6</b>	<b>1</b>	<b>4</b>	<b>3</b>	<b>0</b>

Source: Alliance Environnement analysis based on CMEF (2017) and case studies

### Cross-compliance

Cross-compliance is a regulatory tool of the CAP that applies to most of farmers. In 2017, according to CMEF output indicators, 83% of agricultural area was concerned by cross-compliance rules, and 92% of CAP support was subject to cross-compliance. As more than 50% of UAA is concerned, the uptake score is set at 3 for all GAECs and SMRs. Cross-compliance ensures that beneficiaries of the CAP support implement mandatory minimum practices. However, the level of verification is quite low (only 1% of the farmers have to be verified on-farm). The threat of the potential financial penalty for non-compliant farmers can act as a lever to ensure implementation of cross-compliance standards. However, the calculation and the application of penalties vary significantly between Member States. A recent study on cross-compliance controls written as part of the Commission's work on the Water and Agricultural Nexus<sup>62</sup> shows that the level of intentional or reoccurring non-conformity is almost nil on cross-compliance.

**The level of requirements for the GAECs and SMRs was assessed in ESQ 1. It is given on a scale from 1 (low level of requirement) to 3 (high level of requirement), based on the number and relevance of items checked in relation with the implementation of water-friendly practices.**

### GAEC 1 – Establishment of buffer strips along watercourses

GAEC 1 on the implementation of buffer strips is very significant in protecting water from pollution but also in protecting riparian margins. It is especially efficient when both **chemical and fertiliser application is forbidden (e.g. in DE, ES, FR, NL, PL, FI)**, but also when buffer strips are **covered by vegetation** and **wide enough to prevent pollutants transfer** into water. It is implemented quite well by farmers (1% of non-compliance on average in 2015 at case-study Member State level), even though it was mentioned during the case-studies in Germany, Spain and the Netherlands that this measure is perceived as constraining by farmers, as it reduces productive area. The level of requirement of GAEC 1 was assessed in ESQ 1, which examined the level of requirements in relation to water by considering the number of items verified on-farm and their relevance for water protection.

**Table 14: Assessment of the effects of GAEC 1  
on water quality and quantitative management**

Score indicator	DE	ES	FR	HR	IT	NL	AT	PL	RO	FI
Uptake	3									
Requirement (relevance of items checked)	3	3	3	2	2	3	1	3	2	3
<b>Effectiveness (quantitative and qualitative)</b>	<b>9</b>	<b>9</b>	<b>9</b>	<b>6</b>	<b>6</b>	<b>9</b>	<b>3</b>	<b>9</b>	<b>6</b>	<b>9</b>

Source: Alliance Environnement analysis based on CMEF (2017) and case studies

### GAEC 3 – Protection of groundwater against pollution

This GAEC directly targets water pollution according to Annex II of Regulation (EU) No 1306/2013 by **prohibiting the direct or indirect discharge of some substances** in water. In addition to this requirement, only some Member States verify other aspects under this GAEC, such as the **livestock manure storage distance from water** (in FI, FR or DE), the **proper disposal of pollutants** and the absence of leakage storage tanks (in DE). In Finland and Germany, it is perceived by farmers as highly constraining, according to the farm advisers interviewed. However, the rate of non-conformity for this GAEC is low (3% on average in 2015) at the EU level.

<sup>62</sup> Report not published at the time of this evaluation study.

**Table 15: Assessment of the effects of GAEC 3 on water quality and quantitative management**

Score indicator	DE	ES	FR	HR	IT	NL	AT	PL	RO	FI
Uptake	3									
Requirement (relevance of items checked)	3	2	3	2	2	2	2	3	2	3
<b>Effectiveness (quantitative and qualitative)</b>	<b>9</b>	<b>6</b>	<b>9</b>	<b>6</b>	<b>6</b>	<b>6</b>	<b>6</b>	<b>9</b>	<b>6</b>	<b>9</b>

Source: Alliance Environnement analysis based on CMEF (2017) and case studies

#### GAEC 4 – Minimum soil cover

This GAEC directly affects water quality and quantity by promoting **soil cover** between the main crops in Nitrate Vulnerable Zones but also by enforcing **sufficient coverage** on fallow land (in DE, ES, FR, NL, AT and FI) or after a ploughing or the removal of permanent crops (in DE, FR and FI). This GAEC is considered particularly constraining by farmers according to case studies, in particular because climatic conditions sometimes prevent farmers from sowing the cover, or do not allow its germination. This GAEC has a low non-conformity rate (3.6% on average in 2015) at the EU level, except in Spain (10%), which is probably linked to extra requirements on fallow land and permanent crops (see ESQ 1).

**Table 16: Assessment of the effects of GAEC 4 on water quality and quantitative management**

Score indicator	DE	ES	FR	HR	IT	NL	AT	PL	RO	FI
Uptake	3									
Requirement (relevance of items checked)	3	3	3	2	1	2	2	2	1	3
<b>Effectiveness (quantitative and qualitative)</b>	<b>9</b>	<b>9</b>	<b>9</b>	<b>6</b>	<b>3</b>	<b>6</b>	<b>6</b>	<b>6</b>	<b>3</b>	<b>9</b>

Source: Alliance Environnement analysis based on CMEF (2017) and case studies

#### GAEC 5 – Land management to limit soil erosion

Limiting erosion is key for water protection from pollution. Under GAEC 5, **ploughing** can be forbidden by MS in specific contexts (depending on the slope or climatic conditions) and any activities likely to cause soil erosion sanctioned (e.g. **overgrazing** in Finland). In practice, requirements under this GAEC are quite different in the case-study Member States. It should be noted that, by limiting ploughing on slopes, this measure can also have an indirect effect on water-retention capacity in some Member States (DE, ES, FR, NL, AT, PL, RO). This GAEC, which was judged as not very constraining in the case studies, recorded a rather low rate of non-conformity in the case-study Member States (<1% in 2015 at case-study Member State level).

**Table 17: Assessment of the effects of GAEC 5 on water quality and quantitative management**

Score indicator	DE	ES	FR	HR	IT	NL	AT	PL	RO	FI
Uptake	3									
Requirement (relevance of items checked)	3	2	3	2	2	3	3	3	3	2
<b>Effectiveness (quantitative and qualitative)</b>	<b>9</b>	<b>6</b>	<b>9</b>	<b>6</b>	<b>6</b>	<b>9</b>	<b>9</b>	<b>9</b>	<b>9</b>	<b>6</b>

Source: Alliance Environnement analysis based on CMEF (2017) and case studies

#### GAEC 6 – Maintenance of soil organic matter

GAEC 6 refers to only the **absence of any burning of crop residues**. This requirement has indirect effects on water quality and quantity, by promoting soil coverage and organic matter conservation (see introductory chapter). But the case studies indicated that this GAEC hardly affects farmers' practices and the level of non-conformity in the case-study Member States is very low for GAEC 6 (1%). Exemptions to the interdiction of burning crop residues are possible in all case-study Member States except Romania. This is why Romania ended up with a higher level of requirements in the table below.

**Table 18: Assessment of the effects of GAEC 6 on water quality and quantitative management**

Score indicator	DE	ES	FR	HR	IT	NL	AT	PL	RO	FI
Uptake	3									
Requirement (overall effects and exemption)	2	2	2	2	2	2	2	2	3	2
<b>Effectiveness (quantitative and qualitative)</b>	<b>6</b>	<b>6</b>	<b>6</b>	<b>6</b>	<b>6</b>	<b>6</b>	<b>6</b>	<b>6</b>	<b>9</b>	<b>6</b>

Source: Alliance Environnement analysis based on CMEF (2017) and case studies

## SMR 1 – Protection of waters against pollution caused by nitrates from agricultural sources

SMR1 targets a water pollution objective, by enforcing compliance with the Nitrates Directive. It concerns only areas in Nitrate Vulnerable Zones (NVZs); thus, the area concerned is quite variable between Member States, limiting the uptake of this measure. Five case-study Member States have their whole territory declared as NVZs (DE, NL, PL, RO, FI). This explains why their uptake is set at 3 (high level of uptake). Quite a number of aspects are verified under SMR 1. If **spreading dates** and **storage capacities** are verified in each case-study Member State, the other aspects verified are quite different between them (e.g. appropriate collection of livestock manure, use of fertilisation forecast plan, soil analysis, etc.). It was reported in most of case-study Member-States (DE, ES, FR, HR, PL, FI) that SMR 1 makes for high levels of constraints for farmers (especially the storage capacities requirement). In Germany, Spain and Austria, verification of fertiliser and pesticide use on buffer strip, as well as permanent vegetation cover along water bodies is particularly strict for water-quality issues.

**Table 19: Assessment of the effects of SMR 1 on water-quality management**

Score indicator	DE	ES	FR	HR	IT	NL	AT	PL	RO	FI
Uptake (% of UAA in NVZs)	3	2	2	1	2	3	3	3	3	3
Requirement (relevance of items checked)	3	2	2	2	2	2	3	3	2	3
<b>Effectiveness (quality)</b>	<b>9</b>	<b>4</b>	<b>4</b>	<b>2</b>	<b>4</b>	<b>6</b>	<b>9</b>	<b>9</b>	<b>6</b>	<b>9</b>

Source: Alliance Environnement analysis based on CMEF (2017) and case studies

## SMR 10 – Plant protection products

SMR 10 is relevant to the protection of groundwater from contamination by plant-protection products. The only element verified in all the case-study Member States is **use of products with marketing authorisation**. Besides this, many aspects (up to 17 in Austria) are checked with direct effects (e.g. appropriate means to avoid products drifting outside the treated area) or indirect effects (e.g. bee protection rules) on water protection. Its high rate of non-conformity (5.7% at the EU level) may reflect its significant level of requirement and perhaps lack of advice on this SMR implementation requirement.

**Table 20: Assessment of the effects of SMR 10 on water-quality management**

Score indicator	DE	ES	FR	HR	IT	NL	AT	PL	RO	FI
Uptake	3									
Requirement (relevance of items checked)	3	2	3	2	3	1	3	2	3	2
<b>Effectiveness (quality)</b>	<b>9</b>	<b>6</b>	<b>9</b>	<b>6</b>	<b>9</b>	<b>3</b>	<b>9</b>	<b>6</b>	<b>9</b>	<b>6</b>

Source: Alliance Environnement analysis based on CMEF (2017) and case studies

### 5.4.2.3 Voluntary measures under the RDP affecting crop, plot and livestock management

For the RDP measure effectiveness analysis, uptake was set on a scale from 1 (limited scope) to 3 (broad scope) depending on the ability of the measure to reach a large share of UAA or farmers. The level of requirement on water issues was set on a scale from 1 (low level) to 3 (high level). Precisions on score indicators are given for each measure.

**Table 21: Definition of the uptake level for effectiveness analysis**

Score	Share of UAA/ farmers concerned
<b>1</b>	Less than 10%
<b>2</b>	Between 10 and 50%
<b>3</b>	More than 50%

Source: Alliance Environnement, from CMEF 2017

## M4 Investments in physical assets

M4 contributed to the implementation of sustainable practices on water by enabling farmers to invest in specific equipment to limit water pollution, but also to enhance quantitative management of water, by promoting new management practices (e.g. minimal soil cultivation, soil incorporation of crop residuals) or by promoting investment in irrigation and water collection infrastructure (see section 5.4.4 below). All Member States used this measure, which reached around 5% of EU farmers (CMEF output indicators 2017). Only 5% of the total EU public expenditure under M4 is allocated to Priority 4 and

Focus Area 5D and 5E in 2017, and 18.5% of the holdings supported by M4.1 invested in equipment related to these Priority and FAs<sup>63</sup>. According to Types of Operation analysis by experts in case studies, the water-relevant support under M4 mostly concerns suitable equipment for **manure management and storage, precision farming to limit the use of fertilisers and pesticides** and equipment for the **maintenance or creation of buffer strips and riparian margins** (e.g. in IT and NL) or landscape features (e.g. in FR, IT and AT). The success of these measures was especially high in Apulia (IT), where so many farmers applied that the Managing Authorities had to reject many applicants, who have decided to take action within the Regional administrative court. It can be noted that in Alsace (FR) M4 support co-funded by the Water Agency specifically targets equipment for grass management, miscanthus production and organic farming production, as such productions/areas are considered as highly relevant for water protection in this Region<sup>64</sup>. Nevertheless, in North Rhine-Westphalia (DE), it was pointed out that investments that could be beneficial to water are not supported by M4 (e.g. precision farming, interim slurry tanks in areas with little livestock density).

In the table below, uptake was set regarding the share of farmers benefiting from M4 under Priority 4, Focus Areas 5A, 5D and 5E, in each Member State. The requirement level depends on the eligible investments relevant to water quality and quantity (e.g. water collection, recycling, use of precision farming, non-productive investments)<sup>65</sup>. As some investments under M4 have potentially negative effects on water (quantity and quality), the requirement level is set at 2 as a maximum. It is lowered whenever less than two Types of Operations relevant to water quality and/or quantity are present.

**Table 22: Assessment of the effects of M4 on management practices affecting water quality and quantitative management**

Score indicator	DE	ES	FR	HR	IT	NL	AT	PL	RO	FI
Uptake	1	1	0	1	1	0	0	1	1	1
Requirement (quantitative - TO)	0	2	2	2	2	2	2	2	2	2
Requirement (qualitative - TO)	0	1	2	1	2	2	1	2	0	1
<b>Effectiveness (quantitative)</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>2</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>2</b>	<b>2</b>
<b>Effectiveness (qualitative)</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>1</b>

Source: Alliance Environnement analysis based on CMEF O4 (2017) and case studies

## M10 Agri-environment-climate

The uptake of this measure is quite large at the EU level, since the measure reached around 30% of the EU total UAA (CMEF output indicators 2017), and 100% of actions supported are programmed under Priority 4 and Focus Areas 5D and 5E. However, the level of uptake significantly varies between Member States.

Interviewees agreed on the fact that M10 can promote practices beneficial for water protection. According to the analysis of the Types of Operation supported in the case studies, the crop and livestock management practices promoted under this measure highly varied. Member States alternatively use this measure to promote practices beneficial for water quality and quantitative management (**maintenance and creation of buffer strips and strips on fields, use of catch and cover crops, crop residual management, promotion of extensive livestock farming, etc.**), water quality only (e.g. **use of biological control of pests, use of nutrient management plans, appropriate disposal of hazardous substances**) or water quantitative management only (**maintenance and creation of wetland, riparian bank protection or use of artificial drainage**). As shown in the introductory chapter, drainage (supported in the Netherlands under AECM) can have negative effects on water quality since it accelerates transit of substances into surface water. It should also be noted that, according to the Water Agency in Alsace (FR), the AECMs for limited use of phytosanitary products are only effective in the long run, when farmers continue AECM from one period to another. Moreover, in Austria farmers had a limited time to apply for AECMs up to autumn 2017. For administrative efficiency, no more

<sup>63</sup> CMEF output indicators (O4), 2017.

<sup>64</sup> In Alsace (FR), the Water Agency ceased to co-funding investment in precision farming equipment, which was deemed as not effective enough to improve the chemical status of waterbodies.

<sup>65</sup> From case-study RDP analysis.

application is considered after this deadline. It should be noted that, according to interviewees, the collective approach has favoured the uptake of M10 in the Netherlands.

M10.1 requirement score is based on the number of water-relevant practices available. The score is set at 3 if more than five water-relevant Types of Operations are available, if less, the score is lowered to 2. The use of artificial drainage in the Netherlands scores -1 because of its potential negative impact (see above). However, as it is not the only practice supported and because other practices may have positive impact on water (i.e. riparian/bank protection), the final score is set at 2.

**Table 23: Assessment of the effects of M10.1 on management practices affecting water quality and quantitative management**

Score indicator	DE	ES	FR	HR	IT	NL	AT	PL	RO	FI
Uptake	2	2	1	NA	1	1	3	1	1	3
Requirement (quality) - TO	2	2	3	3	2	2	3	2	2	3
Requirement (quantity) - TO	2	2	3	2	2	2	3	2	2	2
<b>Effectiveness (quality)</b>	<b>4</b>	<b>4</b>	<b>3</b>	<b>NA</b>	<b>2</b>	<b>2</b>	<b>9</b>	<b>2</b>	<b>2</b>	<b>9</b>
<b>Effectiveness (quantity)</b>	<b>4</b>	<b>4</b>	<b>3</b>	<b>NA</b>	<b>2</b>	<b>2</b>	<b>9</b>	<b>2</b>	<b>2</b>	<b>6</b>

Source: Alliance Environnement analysis based on CMEF O6 (2017) and case studies

## M11 Organic farming

This measure reached around 9% of the EU total UAA (CMEF output indicators 2017), and 100% of actions directly targeted Priority 4 and Focus Areas 5D and 5E. All the interviewees in case-study Member States agreed on the fact that M11 contributed significantly to the development of organic farming and therefore promoted a change of management practices with positive impact on water both directly on water quality (e.g. no synthetic pesticides used) and to some extent indirectly on water quality and quantitative management (e.g. crop diversification, increased soil coverage, etc.). Furthermore, its market development has also been mentioned as an important factor explaining the choice of farmers to convert to this farming system. Survey results showed that, according to farmers' advisers and representatives, M11 does contribute to the development of biological control of pests and precision farming, thereby reducing the use of fertilisers and pesticides (DE, ES, FR, HR, IT, AT, RO, FI) as well as to conservation or soil incorporation of crop residuals (HR, IT, AT, PL, RO, FI).

The requirement level on water quality for M11 was set at 3 for all Member States, based on the fact that promoting organic farming has beneficial effects on water protection.

**Table 24: Assessment of the effects of M11 on management practices affecting water quality and quantitative management**

Score indicator	DE	ES	FR	HR	IT	NL	AT	PL	RO	FI
Uptake	1	1	1	1	1	-	2	1	1	2
Requirement (quality) – expected effects	3									
Requirement (quantity) - expected effects	1									
<b>Effectiveness (quality)</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>-</b>	<b>6</b>	<b>3</b>	<b>3</b>	<b>6</b>
<b>Effectiveness (quantity)</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>-</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>2</b>

Source: Alliance Environnement analysis based on CMEF O5 (2017) and case studies

## M12 Natura 2000 and Water Framework Directive

This measure reached around 6% of the EU total UAA (CMEF output indicators), and 100% of actions were programmed under Priority 4. Only some of the case-study Member States used M12 (DE, ES, IT, AT), and only Germany mentioned a significant positive effect of this measure on practices relevant to water protection, without specifying if it was mostly related to quality or quantity objectives.

The level of requirements for M12 was based on assessments from case studies. M12 was used only in 4 out the 10 cases studies. Water-relevant effects were reported only in North Rhine-Westphalia (DE), which was given the score of 2. In Italy and Austria, M12 only targeted N2000 areas and in Spain, it was implemented to target both N2000 and WFD but no executed budget was reported under AIR data and the uptake is inferior to 1%.



**Table 25: Assessment of the effectiveness of M12 on management practices affecting water quality and quantitative management**

Score indicator	DE	ES	FR	HR	IT	NL	AT	PL	RO	FI
Uptake	1	1	0	0	1	0	1	0	0	0
Requirement	2	1	0	0	1	0	1	0	0	0
<b>Effectiveness (quality and quantity)</b>	<b>2</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>

Source: Alliance Environnement analysis based on CMEF O5 (2017) and case studies

### 5.4.3 EFFECTS OF CAP INSTRUMENTS AND MEASURES ON LAND-USE PRACTICES AFFECTING WATER RESOURCES IN TERMS OF QUALITY AND QUANTITY

In this section, only the effects of the evaluated measures and instruments on land use that affect water quality and quantitative management are assessed. Therefore, the analysis focuses on the effects on the development of **grassland, fallow, land planted with leguminous crops, and forests** but also of **landscape features** such as hedges, ponds, trees, etc. The link between these practices and water pressures is detailed in ESQ 4 and ESQ 5.

#### 5.4.3.1 Regulatory and mandatory measures to ensure minimum land cover beneficial for the water resources

##### GAEC 7 – Retention of landscape features

Under cross-compliance, GAEC 7 promotes the retention of landscape features that can affect both quality and quantitative management of water. GAEC 7 impacts on land occupation as it requires the maintenance of certain **landscape features** that are expected to have a positive effect on both water quantity and quality. However, the level of requirement depends on the number of landscape features (hedges, ponds, trees in lines, etc.) protected and on the strictness of the measure (i.e. on the possibility to remove some features provided they receive special authorisation). The requirement level is set for each Member State based on these two parameters. It should also be noted that the measure is quite well complied with given the low non-conformity rate associated with GAEC 7 (less than 2.5% on average in 2015).

**Table 26: Assessment of the effects of GAEC 7 on water quality and quantitative management**

Score indicator	DE	ES	FR	HR	IT	NL	AT	PL	RO	FI
Uptake	3									
Requirement (relevance of items checked)	3	3	2	3	3	1	3	2	2	1
Requirement (quantity -ploughing on sloped plots)	2	2	2	1	1	2	2	2	2	1
<b>Effectiveness (quality)</b>	<b>9</b>	<b>9</b>	<b>6</b>	<b>9</b>	<b>9</b>	<b>3</b>	<b>9</b>	<b>6</b>	<b>6</b>	<b>3</b>
<b>Effectiveness (quantity)</b>	<b>6</b>	<b>6</b>	<b>6</b>	<b>3</b>	<b>3</b>	<b>6</b>	<b>6</b>	<b>6</b>	<b>6</b>	<b>3</b>

Source: Alliance Environnement analysis based on CMEF (2017) and case studies

##### Greening measures (Pillar I)

If a farmer is found non-compliant with crop diversification requirements, the surface eligible for greening measures can be reduced up to 50%. The same kind of sanction applies to ESPG and EFA measures. If the sum of non-compliance for greening measures leads the farmer to more than 20% reduction of his eligible area, no greening payment is received. If this value reaches 50%, extra financial sanctions might be applied<sup>66</sup>. Therefore, the coercive effect is set at 3 for greening measures.

##### Diversification

**Diversification, especially when accompanied by rotation,** can indirectly affect water quality (e.g. by limiting the need for pesticides). The crop diversification measure applied to 76% of arable land in 2018 data. Its uptake is thus set at 3. Still, the diversification measure hardly changed farmers' practices. Indeed, most arable land was already diversified (79% of arable land) in 2014 (Alliance

<sup>66</sup> Commission Delegated Regulation (EU) No 640/2014 of 11 March 2014.



Environnement 2017b). Also, about 12% of arable land was exempted from the diversification measures (e.g. organic farms or fallow land, grassland). However, the diversification measure ensures the maintenance of a minimum level of crop diversification. Among the farms that had to diversify, around half of them diversify their cropping system. However, this measure only promotes diversification: it does not ensure crop rotation, which has many indirect benefits for water protection (limiting the need for pesticides, increasing organic matter, etc.). The most significant changes observed are a decrease in areas of common wheat, barley and maize and an increase in the area of protein crops, such as peas, field beans, soya beans, etc. (Alliance Environnement 2017b).

Among the six Member States that decided to introduce crop-diversification equivalence schemes, two (Poland and Austria) decided to implement more demanding crop diversification measures through AECMs with the above-mentioned effects potentially increased. The four others (Ireland, France, Portugal and the Netherlands) decided to replace the diversification requirement with an obligation to plant **catch or cover crops** on all the arable land of the holding. Catch and cover crops have many positive effects on water-related pressure, but they are already promoted by other instruments (e.g. SMR 1). Thus, this equivalent scheme brings little additional effect. Moreover, in the case of France and Portugal, monocropping areas are often those of tomato and maize production, which are mostly irrigated (Alliance Environnement 2017b) and are characterised by relatively significant use of pesticides.

The uptake for diversification considered the share of the UAA concerned by crop diversification. The score is set at 1 when this share is less than 10%, 2 when between 10 and 50% and 3 when above 50%. The level of requirement takes into account the presence of equivalence schemes based on catch or cover crops (score lowered) and the presence of synergies with more demanding measures through AECMs (upgraded score).

**Table 27: Assessment of the effects of the diversification measure of greening on water quality and quantitative management**

Score indicator	DE	ES	FR	HR	IT	NL	AT	PL	RO	FI
Uptake	3	3	3	3	2	2	3	3	3	3
Requirement (quality) considering equivalence	2	2	1	2	3	1	3	3	2	2
Requirement (quantity) considering equivalence	0	0	-1	0	0	0	0	0	0	0
<b>Effectiveness (quality)</b>	<b>6</b>	<b>6</b>	<b>3</b>	<b>6</b>	<b>6</b>	<b>2</b>	<b>9</b>	<b>9</b>	<b>6</b>	<b>6</b>
<b>Effectiveness (quantity)</b>	<b>0</b>	<b>0</b>	<b>-3</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

Source: Alliance Environnement analysis based on CMEF (2017) and case studies

### Permanent grassland

As shown in the introductory section, **permanent grassland**, though targeting directly carbon sequestration, can also have highly positive effects both on water quality and quantitative management. The permanent grassland ratio requirement provides a safety net (European Commission 2016b) but has not stopped the loss of grassland, as this ratio already decreased in 10 Member States and regions (UK EN, EE, PT, EL, BE FL, RO, SI, DE, DK, UK SC) between 2015 and 2018. Moreover, the ability to operate the ratio at regional or even national level in most of the Member States conceals regional and sub-regional significant levels of permanent grassland loss.

With the introduction of the 2014-2020 CAP framework, specific areas were not considered as permanent grasslands. This was especially the case in Spain, where herbaceous forage is not predominant or constituted by shrubs and trees. Recent changes introduced by the 'Omnibus' regulation reinstated some of these areas as eligible for permanent grasslands. According to the first definition of permanent grassland, these areas can be ploughed and reseeded without impacting the ratio, which might significantly limit the positive effects of the measure on water-related pressures and status. No data are available on how much permanent grassland is ploughed and reseeded. However, since the 'Omnibus' regulation, Member States can decide that, to be considered as permanent grassland, the area cannot be ploughed at all. This possibility has been enacted by seven Member States (BG, HR, CY, DE, EL, IT, LT)<sup>67</sup>. An equivalent measure exists in Scotland (UK) that requests farmers to have a fertiliser

<sup>67</sup> However, negative side-effects were underlined by the stakeholders interviewed, i.e. farmers ploughing grasslands more often to avoid their classification as permanent grasslands.

management plan limiting nitrogen runoff and leaching, thereby providing an additional positive effect on water quality.

The uptake is the share of permanent grasslands already existing before 2015, that were classified as permanent grasslands under the greening obligation. The score is set at 1 when this share is less than 10%, 2 when between 10 and 50% and 3 when above 50%. The requirement score is based on three criteria, i.e. the trends in PG ratio, ban on ploughing and scale of PG ratio calculation (regional/national).

**Table 28: Assessment of the effects of the permanent grassland measure of greening on water quality and quantitative management**

Score indicator	DE	ES	FR	HR	IT	NL	AT	PL	RO	FI
Uptake	3	3	3	2	2	3	3	3	2	3
Requirement (change in ratio and possibility to plough)	3	2	3	3	3	2	2	2	1	3
<b>Effectiveness (quantity and quality)</b>	<b>9</b>	<b>6</b>	<b>9</b>	<b>6</b>	<b>6</b>	<b>6</b>	<b>6</b>	<b>6</b>	<b>2</b>	<b>9</b>

Source: Alliance Environnement analysis based on CMEF (2017) and case studies

### Environmentally Sensitive Permanent Grassland (ESPG)

The **ESPG** measure strictly prohibits any conversion or ploughing of permanent grassland designated as sensitive, especially in Natura 2000 areas. Besides the positive effect of protection of **permanent grassland** mentioned above, Natura 2000 zones include areas of high nature value, but also areas with carbon-rich soil and **wetlands**, which are two important aspects for water protection and retention. The share of permanent grasslands considered as ESGP in 2018 has been used to determine the uptake of the measure by Member States.

The uptake for ESGP takes into account the share of permanent grasslands classified as ESGP. The score is set at 1 when this share is less than 10%, 2 when between 10 and 50% and 3 when above 50%. The level of requirement is set at 3 by default, as this measure is beneficial for water issues.

**Table 29: Assessment of the effectiveness of the ESGP measure of greening on water quality and quantitative management**

Score indicator	DE	ES	FR	HR	IT	NL	AT	PL	RO	FI
Uptake	2	2	1	1	2	1	1	1	2	1
Requirement (expected effects)	3	3	3	3	3	3	3	3	3	3
<b>Effectiveness (quantity and quality)</b>	<b>6</b>	<b>6</b>	<b>3</b>	<b>3</b>	<b>6</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>6</b>	<b>3</b>

Source: Alliance Environnement analysis based on CMEF (2017) and case studies

### Ecological Focus Areas

According to EU data (2018), 70% of arable land is under EFAs in the EU.

Most of the EFA elements can influence land use related to water quality (i.e. **landscape features, fallow land, nitrogen-fixing crops, short-rotation coppices and forest areas**) and also positively impact water quantity (aside from nitrogen-fixing crops and short-rotation coppice area). Three of them are among the most widely declared EFA elements: **nitrogen-fixing crops** (35.1%), **fallow area** (32.1%) and **landscape features** (5.3%). In terms of effect, the evaluation of the greening measures (Alliance Environnement, 2017) shows that the EFA measures can partly explain the increase of **nitrogen-fixing crops** both with diversification, VCS and market developments. The decrease in fallow area was also restrained by the EFA measure. Since this evaluation, it should be noted that the percentage of EFAs covered by nitrogen-fixing crops decreased, perhaps because of the ban on pesticides on this area, but this opinion is not shared by all stakeholders.

The uptake score was set considering the share of the UAA under EFAs. The score is set at 1 when this share is less than 10%, 2 when between 10 and 50% and 3 when above 50%. However, exemptions to EFA apply to organic farms, or fallows and grassland areas. The requirement score considers the share of land under EFAs influencing land cover as beneficial to water quality and water quantity. The score is set at 3 if this share is above 10%, 1 if below 5% and 2 if between 5% and 10%.

**Table 30: Assessment of the effectiveness of EFA measures of greening on water quality and quantitative management**

Score indicator	DE	ES	FR	HR	IT	NL	AT	PL	RO	FI
Uptake (%UAA under EFAs)	3	3	3	2	2	2	1	2	3	1
Area covered (quality)	1	2	1	3	2	1	1	1	1	1
Area covered (quantity)	1	2	1	1	1	1	1	1	1	1
<b>Effectiveness (quality)</b>	<b>3</b>	<b>6</b>	<b>3</b>	<b>6</b>	<b>2</b>	<b>2</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>1</b>
<b>Effectiveness (quantity)</b>	<b>3</b>	<b>6</b>	<b>3</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>1</b>

Source: Alliance Environnement analysis based on CMEF (2017) and case studies

#### 5.4.3.2 Voluntary measures under the RDP to encourage the introduction/maintenance of land cover beneficial for water resources

In the RDPs, M8, M10 and M15 can be requested by farmers who wish to implement specific land covers such as permanent grassland, forest areas, landscape features or nitrogen-fixing crop areas that can impact both water quality and quantitative management.

Voluntary measures under the RDPs do not generate high financial risks for farmers in the event of non-compliance. According to Article 35 of Delegated Regulation (EU) No 640/2014, the financial support associated with a given RD measure can be withdrawn up to 100%, depending on the extent of the non-conformity, but no extra penalty is applied. With voluntary measures, the financial risk is mostly due to the fact that the payment rate for a measure does not always cover the direct or administrative cost of the measure. Nevertheless, as shown in the Efficiency ESQs, the payment rate for M10, M8 and M15 is generally considered as sufficient to cover the opportunity and transaction costs incurred by farmers, even if it can be observed that a higher payment rate would have increased the adoption of the measures for some types of farms (especially the most profitable ones).

##### M10 Agri-environment-climate measures

The uptake of this measure is quite large since the measure reached around 37% of the EU total UAA (CMEF output indicators 2017), and 100% of actions are programmed under Priority 4 and Focus Areas 5D and 5E.

Interviewees agreed on the fact that M10 can promote practices beneficial for water protection. According to the analysis of Type of Operation in the case studies, six out of the ten Member States used this measure to promote **diversification** (with potential effects on water quality), **the maintenance and/or creation of landscape features** and **permanent grassland area** (affecting pressures related to both water quality and quantity). In Alsace (FR), the budget is focused on the preservation of grassland areas, as this type of operation is judged effective for water protection by Water Agencies. In Austria as well, 'greening of arable land' has been identified as relevant to these objectives, even if its implementation was difficult due to traditional crop rotation schemes. In the Netherlands, this measure has been used through a collective approach which contributed to involve farmers of a specific area in a collective water management project and limits the level of administrative burden while increasing the effectiveness of the measures, according to Managing Authority. It should be noted that, according to interviewees, the collective approach has favoured the uptake of M10 in the Netherlands.

M10.1 requirement score is based on the number of water-relevant operations influencing land use. available. The score is set at 3 if more than five water-relevant Types of Operations are available, if less, the score is lowered to 2.

**Table 31: Assessment of the effects of M10.1 on land-use practices affecting water quality and quantitative management**

Score indicator	DE	ES	FR	HR	IT	NL	AT	PL	RO	FI
Uptake	2	2	1	NA	1	1	3	1	1	3
Quantity of relevant Types of Operation (quality)	2	0	3	0	0	1	2	2	2	2
Quantity of relevant Types of Operation (quantity)	2	0	2	0	0	0	2	0	2	2
<b>Effectiveness (quality)</b>	<b>4</b>	<b>0</b>	<b>3</b>	<b>NA</b>	<b>0</b>	<b>1</b>	<b>6</b>	<b>2</b>	<b>2</b>	<b>6</b>
<b>Effectiveness (quantity)</b>	<b>4</b>	<b>0</b>	<b>2</b>	<b>NA</b>	<b>0</b>	<b>0</b>	<b>6</b>	<b>0</b>	<b>2</b>	<b>6</b>

Source: Alliance Environnement analysis based on CMEF (2017) and case studies

## M8 Investments in forest area development and M15 Forest-environment and climate services and forest conservation

Given the significant positive effect of **forest** and **agro-forestry** on both water quality and quantitative management, the potential effect of M8 and M15 is considerable, and the effectiveness of these measures is mostly determined by the area they support. At EU level, M8 reaches 2.5% of the UAA annually on average and M15 0.3%. Even though little area is concerned by this measure, the effect of M8 is considered as important for forest development and conservation in Spain, Italy and Poland, according to interviewees. For these reasons, a common requirement score was set at 3 for M8 and M15. The uptake score is set according to Table 21.

**Table 32: Assessment of the effects of M8 on water quality and quantitative management**

Score indicator	DE	ES	FR	HR	IT	NL	AT	PL	RO	FI
Uptake	1	1	1	1	1	0	1	1	0	0
Requirement (expected effects on water)	3									
<b>Effectiveness (quantity and quality)</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>0</b>	<b>3</b>	<b>3</b>	<b>0</b>	<b>0</b>

Source: Alliance Environnement analysis based on CMEF (2017) and case studies

**Table 33: Assessment of the effects of M15 on water quality and quantitative management**

Score indicator	DE	ES	FR	HR	IT	NL	AT	PL	RO	FI
Uptake	1	1	0	0	1	0	1	0	0	0
Requirement (expected effects on water)	3									
<b>Effectiveness (quantity and quality)</b>	<b>3</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>0</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>0</b>

Source: Alliance Environnement analysis based on CMEF (2017) and case studies

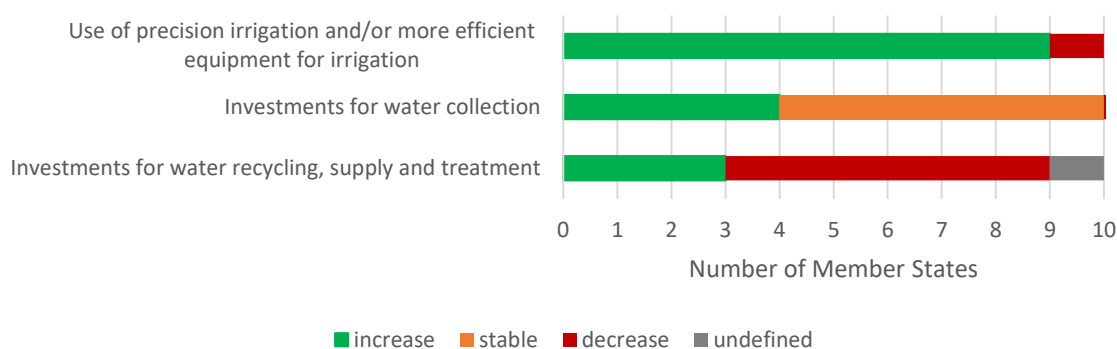
### 5.4.4 EFFECTS OF CAP INSTRUMENTS AND MEASURES IMPROVING IRRIGATION SYSTEMS, INFRASTRUCTURES FOR FLOOD PREVENTION AND WATER RECYCLING AND COLLECTION OF WATER

The CAP framework sets provisions for water abstracted for irrigation to comply with authorisation procedures, determined at Member State level (GAEC 2). However, CAP funding can also be used to support the implementation of not only irrigation systems under certain conditions (e.g. eligibility criteria, ex-ante conditionality) and infrastructures for flood prevention, but also water recycling and collection.

#### 5.4.4.1 Global effect of the CAP measures on irrigation systems and water recycling and collection based on survey results

The figure below shows the main trends in the use of water management-related practices identified as positively affecting water protection in case- study Member States, in a survey sent to farmer advisers and representatives. Even if the use of precision irrigation and more efficient equipment for irrigation increased in 9 out of the 10 case-study Member States, it should be noted that the CAP has been reported as an important driver of change in half of the Member States under study (ES, HR, IT, PL and RO). For investments in water collection and recycling, the survey results indicate that, the CAP has been judged significant in supporting these investments in four Member States (HR, NL, RO and FI). The survey results also indicate that infrastructure for flood prevention receives little CAP support, except in the Netherlands and Finland.

**Figure 15: Trend in the use of practices related to water management in case-study MS (most frequent answer per MS\*)**



Source: Alliance Environnement

#### 5.4.4.2 Regulatory and mandatory measures affecting irrigation

GAEC 2 of cross-compliance is the only mandatory measure on water abstraction applied to farmers under the CAP framework.

##### GAEC 2 – Compliance with authorisation procedures for abstraction of water for irrigation

This GAEC directly targets water according to Annex II of Regulation (EU) No 1306/2013. The rate of non-conformity is quite low in most of the Member States (around 1% on average in 2015 for case-study Member States). Only the obtaining of a water licence is checked in all of them, and only eight case-study Member States verify the compliance of farmers with the authorisation order (ES, FR, HR, IT, NL, PL, RO, FI). In France and Poland, appropriate means to measure the volumes of water withdrawn are required and verified under GAEC 2.

**Table 34: Assessment of the effects of GAEC 2 on water quantitative management**

Score indicator	DE	ES	FR	HR	IT	NL	AT	PL	RO	FI
Uptake	3									
Requirement (relevance of items checked)	2	3	3	3	3	3	2	3	3	3
<b>Effectiveness (quantity)</b>	<b>6</b>	<b>9</b>	<b>9</b>	<b>9</b>	<b>9</b>	<b>9</b>	<b>6</b>	<b>9</b>	<b>9</b>	<b>9</b>

Source: Alliance Environnement analysis based on CMEF (2017) and case studies

#### 5.4.4.3 Voluntary measures affecting irrigation systems

Farmers wishing to invest in more efficient irrigation systems can rely on two types of CAP support depending on their profile. In the RDPs, M4 was often implemented by Member States to support investments for the creation or the modernisation of irrigation systems on farms or irrigation infrastructures outside the farm. However, specific sectors (e.g. fruits and vegetables, vineyards) can benefit from CAP support established according to national operational programmes, targeting investment support for efficient water quantitative use.

##### M4 Investments in physical assets

Little of the budgets under Measure 4 has been targeted toward Focus Area 5A on water quantitative management (0.5% of M4 budget). Support for new irrigation equipment/infrastructure is mostly programmed under FA 2A, but no data are available on the budget or the number of operations supported for investments in irrigation systems out of FA 5A. Hence, most of the Member States examined programmed Types of Operations under Measure 4 that support investments in infrastructure related to water quantitative management. Indeed, all the case-study Member States except Germany have Types of Operations under M4 supporting the use of precision irrigation and/or more efficient equipment for irrigation. In addition, two Member States (NL and FI) support investment for flood prevention, and two others (IT and PL) have Types of Operations supporting water collection and reuse.

As detailed in the description of the regulatory framework, investments in irrigation must comply with several requirements (Article 46 of Regulation (EU) No 1305/2013) in order to guarantee that they are beneficial for water protection. In particular, the entire area in which the investment takes place must be covered by an RBMP, and water metering devices should be installed in the supported farms. In the event of investment in modernisation of irrigation equipment or infrastructure, a minimum water savings is required. For this reason, interviewees in Aragon (ES), Apulia (IT) and Romania agreed on the fact that investments in irrigation led to more efficient and sustainable use of water. But it should be noted that irrigated areas can be increased providing that the waterbodies affected do not have a status less than good and an *ex-ante* assessment shows no significant negative impact on environment. Even in cases in which the waterbody has less than good status, the irrigated area can increase. The condition is that within a combined investment (combining the modernization of an existing installation and “new irrigation”) the investment should ensure effective reduction in water use at the level of the investment as a whole, amounting to at least 50% of the potential water saving made possible (by the modernisation of the existing installation). However, it is difficult to guarantee water savings, as requested by the Regulation, for two reasons (Playàn and Mateos 2006, Lopez-Gunn, Mayor and Dumont 2012). Firstly, when irrigation efficiency increases, the ratio between the quantity of water abstracted and the quantity of water used by the plant decreases, limiting water losses which would have been reattributed to waterbodies. Secondly, a modernised irrigated area can be associated with a shift in productions that are more demanding in terms of water. This again increases the ratio between the quantity of water abstracted and the quantity of water used by the plant, and thus limits the benefits for water resources. Hence, to date, it is difficult to guarantee that investments in irrigation are beneficial to waterbodies, especially if the irrigated area increases where water bodies are under stress.

According to the CMEF indicators (O4 – 2017), no case-study MS/regions allocated budget to M4 support under Focus Area 5A related to water-use efficiency. However, the uptake score was voluntarily set at 1 for Member States supporting efficient irrigation investments. The score granted for the requirement level considers whether efficient equipment for irrigation is eligible under M4, as it can be supported under other Focus area (notably 2A). When this is the case, the score is set at 2 based on interviews and case-study results on the positive effects of the measure to foster changes in quantitative management practices. Four case-study Member States decided to not support irrigation through M4 in their RDPs (DE, NL, PL and FI).

**Table 35: Assessment of the effects of M4 on water quantitative management**

Score indicator	DE	ES	FR	HR	IT	NL	AT	PL	RO	FI
Uptake	0	1	1	1	1	0	1	0	1	0
Requirement (TO)	0	2	2	2	2	0	2	0	2	0
<b>Effectiveness (quantity)</b>	<b>0</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>2</b>	<b>0</b>

Source: Alliance Environnement analysis based on CMEF (2017) and case studies

### Specific-sector support under the CMO regulation

Operational programmes dedicated to specific sectors support operations for better water management. In six Member States (AT, FR, FI, HR, IT, RO), stakeholders mentioned that specific-sector support was granted for irrigation under the CMO regulation. According to the case studies, eligible criteria were determined in some Member States under the operational programmes in the fruit and vegetable sector and in the wine sector, to ensure that installation and/or improvement of any system supported allows for better management of water resources. This support can be eligible under certain conditions (see section 5.1.3.4). For these measures, the effects are very diverse when known, and so it is very difficult to assess their effectiveness in this evaluation.

## 5.4.5 EFFECTS CAP INSTRUMENTS AND MEASURES CONTRIBUTING TO RAISE FARMERS' AWARENESS AND KNOWLEDGE OR PROMOTING COLLABORATIVE ACTIONS ADDRESSING WATER ISSUES

As highlighted in ESQ 2, knowledge and awareness raising, as well as training of farmers, can act as a driver in farmers' choice regarding the implementation of sustainable practices beneficial for water resources. The CAP framework sets provisions for the implementation of a Farm Advisory System in all Member States. It also provides support under M1 and M2 of the RDP to increase the knowledge of farmers and enable them to benefit from the use of advisory services on water issues (among others).



## Farm Advisory System

The implementation of a Farm Advisory Service (FAS) is required in all Member States (Regulation (EU) No 1306/2013). Its main purpose is to help farmers understand EU rules (including GAEC/SMR), but it can also support farmers on environmental issues. In terms of water protection, Member States may provide information on the following subjects related to water quantity management: 1) sustainable, low-volume irrigation systems and how to optimise rain-fed systems in order to promote efficient water use; and 2) information on reducing water use in agriculture, including crop choice, on improving soil humus to increase water retention and on reducing the need to irrigate (Annex I of Regulation (EU) No 1306/2013). Hence, farm advisory services could be considered as an important instrument to protect water in the CAP 2014-2020.

Little information is available on the type of advice provided through the FAS. Moreover, according to previous evaluations and case-study results, in some Member States, the implementation of the FAS only partly affects already existing advisory services. For instance, in Germany, the Netherlands, France and Finland, advisory services were quite well-structured before the implementation of the FAS (also see ESQ 1 on that aspect). In some Member States, competent bodies have been designated with the introduction of the FAS (e.g. in Austria), in others Member States cooperation between advisory bodies have been improved (e.g. in the Netherlands) or specific services were created to focus on environmental or water issues (e.g. in Croatia or in Spain). According to interviewees, in Croatia the FAS is one of the key aspects providing compulsory training on the sustainable use of pesticides, prescribed by the National Action Plan to Achieve Sustainable Use of Pesticides for the period 2013–2023. As a result, the FAS has been reported as an important source of information on water in Croatia, Aragon (Spain) and Austria. Consequently, the uptake score was set at 3, as in Member States with already existing strong advisory services (DE, FR, NL). But FAS implementation is still a challenge in some Member States/regions. In Apulia (Italy), the FAS is suffering from implementation delays and is not operational yet. In Romania, there is still a real need for structuring an effective advisory system, as for the moment farmers are confused about where to ask for advices. In Poland, the water services of the public advisory service system, which is free of charge, have been considered as insufficient compared to the significant need in the Member States. But a number of public advisers are being trained to satisfy the considerable demand.

The potential positive effects on water were assessed according to the case-study information as described in ESQ 1, (see section 5.1.3.5), and corresponding scores were granted to the requirement level on the water issues addressed by the FAS and the extent of farmers targeted.

**Table 36: Assessment of the effects of FAS on water quality and quantitative management**

Score indicator	DE	ES	FR	HR	IT	NL	AT	PL	RO	FI
Uptake	3	3	3	3	1	3	3	1	1	3
Requirement (CS results)	3	3	2	3	3	3	3	2	1	3
<b>Effectiveness (quality and quantity)</b>	<b>9</b>	<b>9</b>	<b>6</b>	<b>9</b>	<b>3</b>	<b>9</b>	<b>9</b>	<b>2</b>	<b>1</b>	<b>9</b>

Source: Alliance Environnement analysis based on CMEF (2017) and case studies

## M1 Knowledge transfer and information actions

Increasing the awareness of farmers and promoting knowledge transfer and information actions were mentioned as important aspects to achieve water qualitative and quantitative objectives during interviews in the ten case studies analysed. All Member States used this measure; however, less than 25% of the supported actions and training days provided directly target Priority 4 and Focus Areas 5D and 5E, and 1.1% Focus Area 5A on water quantity. It should nevertheless be noted that, during interviews, stakeholders mentioned that even when training does not focus on water savings or on water quality, these subjects are often addressed directly anyway (e.g. during training on economic performance to limit input use) or indirectly (e.g. during training on conservation tillage, since these practices can affect soil organic content with effects on both water quantity and quality).

The effectiveness level has been assessed in case-study Member States based on interviews. In some Member States, M1 is quite extensively used to promote water protection (e.g. AT, HR and NL). This is the case in Romania according to interviewees, but the effectiveness of M1 has suffered from late implementation. In Croatia, the FAS is one of the main beneficiaries of M1 (and M2). In the Netherlands, M1 is considered by interviewees as highly relevant to address water issues, as it is used on the first



part of local projects, to raise farmers' awareness and understanding of water-related issues and the link with farming activities. It is the first step of action taken by farmers. The potential of the measure in Poland was also highlighted during interviews but, as stated above, there are not enough advisers to address the demand. In other Member States, M1 has been reported as quite useful in raising farmers' awareness, but water issues are rarely addressed directly (e.g. in ES, IT). Finally, the measure has rarely been used in Germany, France and Finland. In Alsace (FR) and North Rhine-Westphalia (DE), advice is funded through various other traditional ways (e.g. by the Region, Water Agencies, private companies, Chambers of Agriculture, etc.). The complexity of EAFRD and the risk of not fulfilling all requirements and of facing penalties are the main reasons mentioned in interviews for explaining the restraint in using the EAFRD measure in these Member States.

The uptake score indicated in the table below considers the percentage of farmers who benefited from information actions under P4 and FA 5A, 5D and 5E (O12 CMEF 2017). The requirement score is set according to the case-study opinions of stakeholders interviewed.

**Table 37: Assessment of the effects of M1 on water quality and quantitative management**

Score indicator	DE	ES	FR	HR	IT	NL	AT	PL	RO	FI
Uptake	1	1	1	2	1	0	2	0	0	1
Requirement (CS results)	1	1	1	3	2	3	3	2	2	1
<b>Effectiveness (quality and quantity)</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>6</b>	<b>2</b>	<b>0</b>	<b>6</b>	<b>0</b>	<b>0</b>	<b>1</b>

Source: Alliance Environnement analysis based on CMEF (2017) and case studies

## M2 Advisory farm management and relief services

This measure benefited 5.5% of EU farmers (cf. CMEF output indicators). While all Member States programmed this measure, Priority 4 and Focus Areas 5D and 5E were directly targeted by less than 15.5% of the actions supported and Focus Area 5A was by 0.3%. Still, according to interviewees in the case studies, the use of this measure was quite varied among Member States.

The potential effects on water were assessed according to the opinions of stakeholders interviewed. In Croatia, the FAS is the main beneficiary of M2, which is a significant mean of raising farmers' awareness on water issues, as seen above. In Finland, M2 is used to support advisory services including services in charge of water quality. According to the survey results, M2 has significant effects in Finland on the use of machinery limiting soil compaction, the use of precision farming and more efficient equipment to manage fertilisers and pesticides, the use of a nutrient management plan, and the maintenance or creation of buffer strips. In Aragon (ES), Apulia (IT) and Romania, M2 is used to support advisory services but has suffered from delays in its launching. Moreover, only some of the support targeted water-related issues. In Alsace (FR) and North Rhine-Westphalia (DE), M2 was programmed but finally not used because of administrative complexity. M2 was also not or little used in the Netherlands.

The uptake score indicated in the table below considers the percentage of farmers who benefited from advises under P4 and FA 5A, 5D and 5E. The requirement score is set according to the case-study opinions of stakeholders interviewed.

**Table 38: Assessment of the effects of M2 on water quality and quantitative management**

Score indicator	DE	ES	FR	HR	IT	NL	AT	PL	RO	FI
Uptake	1	1	0	1	1	0	0	0	0	2
Requirement (CS results)	0	2	0	3	2	0	0	0	2	3
<b>Effectiveness (quality and quantity)</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>3</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>6</b>

Source: Alliance Environnement analysis based on CMEF (2017) and case studies

## M16 Cooperation

This measure benefited 0.1% of EU farmers (cf. CMEF output indicators). While all Member States used this measure, Priority 4 and Focus Areas 5D and 5E concern less than 11% of the actions supported, and Focus Area 5A 1%. Among the case-study Member States, only few supported projects under this measure that directly targets water (HR and NL and to a lesser extent ES).

Two examples of such financed projects can be mentioned. In Aragon (ES), a project is currently under way, whose objectives are to rethink water management in the Ebro-Aragon basin and pursue innovation in irrigation. In the Baakse Beek source area (NL), a project aims at preventing floods and

ensuring better water quality while improving farm productivity. In the other Member States except Romania, where the measure is not programmed, many projects have been financed on other issues and can have indirect effects on water quality and quantitative management, but no data are available to quantify the extent of this phenomenon.

The uptake score indicated in the table below considers the percentage of farmers engaged into EIP projects under M16 at EU level. The requirement score is set according to the case-study opinions of stakeholders interviewed.

**Table 39: Assessment of the effects of M16 on water quality and quantitative management**

Score indicator	DE	ES	FR	HR	IT	NL	AT	PL	RO	FI
Uptake	1									
Requirement (CS results)	1	2	1	3	1	3	1	1	0	1
<b>Effectiveness (quality and quantity)</b>	<b>1</b>	<b>2</b>	<b>1</b>	<b>3</b>	<b>1</b>	<b>3</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>1</b>

Source: Alliance Environnement analysis based on CMEF (2017) and case studies

### M19 Support for LEADER local development (CLLD)

This measure represents 2% of total public expenditure for Pillar II at EU level; its uptake is thus limited. Moreover, according to interviews, the LEADER approach has only been used to promote projects related to water management in three of the case studies (AT, RO, FI). In Austria, Managing Authorities mentioned that 10 LEADER projects deal with the subject of water (out of a total of 1,046 LEADER projects). The LEADER projects in Austria focus on awareness raising, water in connection with tourism (e.g. educational hiking trails on water) and knowledge transfer (e.g. information centre, nature education and water). In Finland, water-related LEADER projects dealt with making the nutrient flow more efficient and reducing nutrient loads in water in Ostrobothnia (Pohjanmaan ravinneratas – Österbottens näringsshjul) or improving manure utilisation ('Turkisteho' project). According to interviews, these many projects targeting water issues can have significant impact on the local water quality. In Romania, by the end of 2016, 4 out of 36 LEADER projects had actually addressed water use efficiency, notably through the construction, restoration and upgrading of local flood prevention and protection infrastructure. Still, some LEADER projects can have indirect effect on water quality and quantity even if these effects cannot be assessed in the uptake of this evaluation.

**Table 40: Assessment of the effects of M19 on water quality and quantitative management**

Score indicator	DE	ES	FR	HR	IT	NL	AT	PL	RO	FI
Uptake	1									
Requirement (CS results)	1	1	1	1	1	1	3	1	3	3
<b>Effectiveness (quality and quantity)</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>3</b>	<b>1</b>	<b>3</b>	<b>3</b>

Source: Alliance Environnement analysis based on CMEF (2017) and case studies

### 5.4.6 REPLY TO ESQ 3

According to the analysis performed using CMEF output indicators, EU data on greening measures implementation, case-study surveys, interviews and literature, the available CAP instruments and measures addressing sustainable management of natural resources and climate action can promote practices beneficial to water quality objective, and to a lesser extent to water quantity objectives, but their effectiveness depends mostly on the implementation choices of Member States/regions and their corresponding level of requirements.

Greening measures appeared to be the most effective tools to support land-use practices beneficial for water quality and quantity, mostly because of their large uptake and their deterrence effect. The crop diversification and the permanent grassland measure were assessed as contributing to maintain beneficial land-use practices, by ensuring a minimum level of crop diversification and permanent grassland areas. However, the overall grassland areas decreased in several Member States between 2015-2018. Specific implementation choices hindered the effectiveness of such measures. Indeed, the ability to operate the ratio at regional or even national level in most of the Member States conceals regional and sub-regional significant levels of permanent grassland loss. Furthermore, crop

diversification measure equivalent schemes can have negative effects on water quantitative management when preventing the diversification of water-demanding crops.

Cross-compliance was revealed to be an effective tool for influencing land use and crop/livestock management practices beneficial for water quality and quantity, e.g. via maintenance and creation of buffer strips and strips on fields, the appropriate disposal of hazardous substances, the use of catch and cover crops, etc. Its significant effect is mostly due to its large uptake in all case-study Member States (except for SMR 1 depending on the national implementation of NVZs) and to its effective control system. However, its contribution to improved water status mostly depends on the standard set by Member States (see ESQ 1). For instance, GAEC 1 on buffer strips is particularly effective in protecting waterbodies when chemical and fertiliser application as well as ploughing of buffer strips are forbidden by Member States. Similarly, the direct positive effect of GAEC 2 on water over-abstraction is limited by Member States' implementation choices. Indeed, not all Member States studied were found to verify the compliance of farmers with the authorisation order for abstraction, and likewise few Member States actually check the existence of appropriate means to measure the volumes of water withdrawn.

RDP measures studied also showed positive results on land use (M8, M10, M15) and on crop and livestock management practices (M4, M10, M11, M12), despite significantly lower uptake by farmers. As shown in ESQs 1 and 2, the RDPs were designed to address water issues, with selection criteria targeting specific operations or areas facing water issues, depending on the Member States studied. However, the monitoring data do not enable identification of the share of operations supported that actually address water issues relevant to the needs. According to the farm advisers surveyed, the RDP measures were mostly implemented to promote:

- the maintenance and/or creation of landscape features and permanent grassland area, the maintenance and creation of buffer strips and strips on fields, the use of catch and cover crops, crop residual management and extensive livestock farming (with potential effects on water quality and quantity);
- diversification, the use of biological control of pests, the use of nutrient management plan, the use of precision farming, the development of manure storage capacities or the appropriate disposal of hazardous substances (affecting water quality);
- the maintenance and creation of wetland, riparian bank protection, and the use of artificial drainage (affecting water quantity).

It should be noted that the use of artificial drainage, supported under M4 in the Netherlands and Poland, can have indirect negative effects on water quality by carrying pesticides and nitrates directly into surface water. M4 also provides support to improve irrigation systems, infrastructure for flood prevention, and water recycling and collection, although these are relatively limited. Moreover, despite Article 46 of Regulation (EU) No 1305/2013, it is difficult to guarantee that supported investment in irrigation will not lead to an increase pressure on water resources, especially in cases where irrigated area increases. Finally, FAS and RDP measures contributing to raise farmers' awareness and knowledge or promoting collaborative actions addressing water issues (M1, M2, M16, M19) can also have a positive effect on practices beneficial for water quality and quantity; however, because few actions directly target water protection, their effect is difficult to precisely evaluate.

The support granted to specific sectors (e.g. fruits and vegetables, vineyards) according to the CMO regulation was implemented by Member States into national operational programmes, delivering support to operations involving water management, mostly in the form of investments in irrigation systems. According to the case studies, eligible criteria were determined in some Member States to ensure that installation and/or improvement of any system supported allows for better management of water resources. However, the diversity of the operations supported and the lack of information prevent accurate assessment of their effectiveness in this evaluation.

Overall CAP instruments and measures addressing sustainable management of natural resources and climate action were assessed as contributing to alleviate pressures from farming practices on water resources in terms of both quality and quantity. However, their effects mostly depend on Member States' ambition and implementation choices. The regulatory measures of cross-compliance and greening measures were considered as the most effective to ensure minimum practices beneficial for water, essentially by preventing further increase of agricultural pressures on waterbodies.

## 5.5 EFFECTIVENESS – ESQ 4: QUALITY OF WATER - TO WHAT EXTENT AND IN WHAT WAY HAVE THE CAP INSTRUMENTS AND MEASURES ADDRESSING SUSTAINABLE MANAGEMENT OF NATURAL RESOURCES AND CLIMATE ACTION AFFECTED WATER MANAGEMENT, PROTECTION AND USE BY AGRICULTURE A) BY AGRICULTURAL PRACTICES AND FARM TYPES AND B) BY REGIONS OR RIVER BASINS?

### 5.5.1 UNDERSTANDING OF THE QUESTION AND METHODOLOGICAL APPROACH

After ESQ 3, which analysed the effects of CAP instruments and measures addressing sustainable management of natural resources and climate actions on farming practices, ESQ 4 examines the effects of these tools on agricultural pressures related to water quality, i.e. the effects of induced farming practices (see graph in section 2.1.3).

As described in section 2.1.3, five types of pressures are generated by farming practices on the water qualitative status:

- (1) the application of fertilisers and pesticides on land,
- (2) the risk of leaching of fertilisers and pesticides,
- (3) the risk of runoff of fertilisers and pesticides,
- (4) the concentration of pollutants in groundwater,
- (5) soil and bank erosion.

As the level of concentration of pollutants in groundwater is linked to its quantitative status, the effects of water-relevant CAP measures are dealt with in ESQ 4 on water quantity.

Different approaches are used depending on the pressure analysed. The information collected during case studies made it possible to identify the main agricultural pressures at stake in the river basins studied and the CAP instruments and measures implemented to address them.

The CMEF indicators were used to consider the outcomes observed; however, they were not available at RBD level. The FADN was then used to assess to the extent which changes in pressures were reported in these RBDs.

Indeed, the FADN provides information on the permanent grassland area, the share of organic farms and the use of fertilisers and pesticides. This database makes it possible to analyse the input expenditures depending on farm types (depending on the main crops grown) and farm systems (organic farming vs non-organic farming). By providing data on expenditures in pesticides and fertilisers, as well as on CAP support received, FADN data makes it possible, to a certain extent, to investigate the effects of support depending on farm types and other farming practices implemented. As detailed in the box below, instead of the commonly used definition of Types of Farming (see box on FADN in section 4.6.2), a derived approach of 'crop types' was used here. However, results have to be understood carefully, since FADN reports the pesticide and fertiliser expenditures but not the quantity used. In addition, the level of pesticide expenditures does not take into account the relative dangerousness of each molecule used.

#### Box 6: Precautions taken in the use of FADN data to assess the quantity of pesticides and fertilisers used

Various precautions have been taken for a reliable assessment of pesticides and fertilisers use:

- Two proxies are used: pesticide expenditures and fertiliser expenditures. However, the cost of a given pesticide or fertiliser can vary depending on the product considered, but also depending on the Member State. Nonetheless, the table below shows that the quantity of pesticides used per hectare based on Eurostat data are quite correlated with the expenditures in pesticides per hectare based on FADN data ( $R^2=0.64$ ) except for Romania, where the quantity of pesticides used per hectare is low in comparison with pesticide expenditures.

	AT	DE	ES	FR	FI	HR	IT	NL	PL	RO
Pesticide expenditures per ha based on FADN	54	111	64	123	34	61	116	270	59	71
Kg of pesticide used per ha based on Eurostat	1.8	3.7	4.5	3.8	3.0	3.1	6.6	7.8	2.2	1.3

- In the FADN database, the costs are available only at farm level, rather than at crop level. In order to estimate the cost per crop, only the expenditures of farms with more than 50% of their area with a given crop were studied, so most of the costs can be attributed to this crop.
- To ensure that changes in the level of expenditures are not due to the inclusion of new farms in the FADN sample from one year to another, a constant sample was built (i.e. a sample including the same farms in 2015 and 2016).

Data on leaching and runoff of fertilisers and pesticides and on soil and bank erosion are analysed thanks to the WISE database. However, WISE provides data only by river basin, meaning it is not possible to analyse the change in these pressures by farm type. When possible, they were rounded out by CMEF outcomes or impact indicators.

## 5.5.2 OVERALL EFFECTS OF PILLAR II MEASURES ON WATER-QUALITY RELATED PRESSURES

CMEF result indicators provide overall information on the share of agricultural land concerned by measures aimed at:

- Focus Area 4B: 'agricultural land under management contracts to improve water management, including fertilisers and pesticides management', thus covering the three pressures related to pesticides and fertilisers mentioned in the introduction;
- Focus Area 4C: 'agricultural land under management contracts to improve soil management and/or prevent soil erosion'.

**Table 41: Pillar II CMEF result indicators directly related to water management and erosion in 2016**

MS	% UAA under Focus Area 4B	% forestry land under Focus Area 4B	% UAA under Focus Area 4C	% forestry land under Focus Area 4C
BE	0.74	0.00	0.32	0.00
BG	1.21	0.00	1.21	0.00
CZ	11.19	0.00	11.37	0.00
DK	7.23	1.39	7.23	1.39
DE	4.51	0.13	5.32	0.20
EE	61.65	0.00	61.65	0.00
IE	14.34	0.00	14.34	0.00
EL	5.74	0.00	5.75	0.00
ES	11.59	0.00	12.33	0.01
FR	0.67	0.00	0.38	0.00
HR	5.44	0.00	5.44	0.00
IT	6.73	0.33	5.24	0.32
CY	4.87	0.00	8.58	0.00
LV	15.31	0.00	15.31	0.00
LT	0.11	0.00	7.19	0.00
LU	7.32	0.00	2.81	0.00
HU	3.01	0.00	5.29	0.00
MT	1.30	0.00	0.00	0.00
NL	0.00	0.00	0.00	0.00
AT	75.56	0.00	80.67	0.00
PL	8.75	0.00	11.68	0.00
PT	29.42	0.01	34.15	0.02
RO	3.30	0.00	1.08	0.00
SI	43.90	0.00	45.31	0.00
SK	14.47	0.55	14.47	0.55
FI	83.22	0.00	63.72	0.00
SE	2.41	0.00	3.56	0.00
UK	3.76	0.80	4.15	0.80
EU-28	8.59	0.05	8.85	0.06

Source: CMEF result indicators

At EU level, less than 9% of agricultural land was concerned by such management contracts to improve water management, although Estonia, Austria, Finland and to a lesser extent Portugal and Slovenia have significant areas concerned by Pillar II measures under Focus Areas 4B and 4C. CMEF figures for 2016 show that only a few Member States reached the quantified target of 15% of agricultural land for

Focus Area 4B related to fertiliser and pesticide management. Moreover, nine Member States do not reach 5% of their UAA for either Focus Areas, including Member States with significant area and/or production (FR, UK, DE, NL). In addition, a particularly low share of forestry land is under contracts targeting Focus Areas 4B and 4C.

No correlation can be determined with the CMEF impact indicator on the Gross Nutrient Balance in the case-study Member States (see the table below).

**Table 42: Potential surplus of nitrogen on agricultural land**

MS	Mean 2012/2013 (kg N/ha/year)	Mean 2015/2016 (kg N/ha/year)	Change (%)
DE	77	82	6.5%
ES	31.5	39	23.8%
FR	42.5	47	10.6%
HR	69.5	54	-22.3%
IT	75	66	-12.0%
NL	169	194	14.8%
AT	35.5	36.5	2.8%
PL	51.5	48	-6.8%
RO	10	6.5	-35.0%
FI	47.5	48	1.1%

Source: CMEF impact indicators

According to the CMEF indicator, nitrogen surplus increased after the implementation of the current programming period in Spain and the Netherlands, and to a lesser extent in France and Germany. It significantly decreased in Romania and Croatia, but also in Italy and Poland. In all these Member States, the area concerned by management contracts to improve water management, including fertilisers and pesticides management, is relatively small (<10%).

### 5.5.3 ANALYSIS IN CASE-STUDY RIVER BASIN DISTRICTS

The table below synthesises the information collected in the RBDs studied on the specific issues associated with agricultural pressures on water quality, the CAP measures implemented and the potential observed outcomes.

**Table 43: Effects of CAP instruments and measures in case-study RBDs on agricultural pressures affecting water quality**

RBD	Agricultural pressures	CAP support							Pillar II								
		Fallow and grasslands*		Cereals*		Other holdings*		VCS	RDP measures planned** and share of executed budget in 2017					Observed outcomes			
		PI /FNVA	PII /FNVA	PI /FNVA	PII /FNVA	PI /FNVA	PII /FNVA		M1 / M2	M10	M11	M4	Other	Phyto expenses	Fertilisers expenditures	PG area	Share organic farms
<b>Rhine (DE)</b>	N, C	PG 88%	PG 42%	COP 50%, wheat 45%, maize 39%	-	Mixed 46%	-	-	+	+++	+++	++	M8, M12 ++ M16 +	+25%	-22%	Stable	Stable
<b>Ebro (ES)</b>	N, C	PG 331%	PG 31%	COP 103%; wheat 58%	-	Mixed 61%	-	BV, SG, MK	+	+++	+++	+	M8 ++ M12, M16 +	+46%	+6%	-17%	Stable
<b>Rhine (FR)</b>	N, C, RO, E	PG 104%	Fallow/TG 104%	Maize 171%	-	Mixed 52%	-	CL, MK, SG, PC	+	++	+	+	M8 +++ M16 +	+15%	-2%	+7%	+4%
<b>Danube (HR)</b>	N, C, RO, E	Fallow/ TG 102%	PG 32%, Fallow/ TG 23%	COP 114%, maize 104%	COP 33%	Mixed 122%	Mixed 21%	BV, MK, PC, SB	+	+	+++	+	-	+22%	Stable	+2%	Stable
<b>Southern Apennines (IT)</b>	N, C	-	-	Wheat 126%, COP 40%	-	Fruits 32%	-	BV, MK, OL, CL	+	++	++	+	M8, M12 +	-18%	Stable	+36%	-2%
<b>Rhine (NL)</b>	N, C	Fallow/ TG 23%	-	Maize 29%	-	Mixed 43%	-	SG, BV	-	++	NC	+	-	-3%	+2%	+4%	-2.6%
<b>Danube (AT)</b>	N, C, E	PG 138%	PG 245%	COP 137%, wheat 52%, maize 42%	COP 103%, wheat 21%	Mixed 47%	Mixed 23%	BV, SG	+	+++	+++	+	M8 ++ M16 +	+11%	Stable	-23%	-9%
<b>Vistula (PL)</b>	N, C	PG 71%	PG 18%	Maize 4,184%, COP 448%, wheat 102%	Maize 255%, COP 72%	Mixed 125%	Mixed 13%	BV, MK, SB, PC	-	++	++	-	M8 ++	-8%	-31%	+453 %	-50%
<b>Olt (RO)</b>	N, C, E	Fallow/ TG 66%, PG 27%	-	Wheat 122%	-	Mixed 30%	-	MK, PC, SG, SB	-	+	++	+	-	-10%	+23%	-27%	-95%
<b>KSS<sup>1</sup> (FI)</b>	N, C	Fallow/ TG 111%	Fallow/ TG 104%	COP 60%	COP 92%	Mixed 67%	Mixed 99%	BF, MK	+	+++	+++	+	-	-15%	-12%	+69%	-26%

Source: CMEF indicators, AIR data, FADN, case studies

<sup>1</sup> Kokemäenjoki-Saaristomeri-Selkämeri

\* Calculation of the PI and PII payments over the Farm Net Value Added (FADN data). Farm types correspond here to farms with more than 50% of their UAA allocated to the given crop.

\*\* Share of national budget planned under Priority 4 and FAs 5A, 5E and 5D divided by the UAA (AIR, 2017).

\*\*\* Changes in practices between 2012-2013 and 2015-2016 (FADN data).



## Legend:

Agricultural pressures:

N = Nutrients pollution

C = Chemical pollution

E = Erosion

RO = Runoff

Pillar I:

PG = Permanent grassland; TG = Temporary grassland;

COP = Cereals, oilseeds and protein crops

(-) = not significant (<10%)

BV = Beef and veal; MK = milk and milk products;

SG = Sheepmeat and goatmeat; PC= Protein crops;

CL= Cereal; SB= Sugar beet; OL= Olive oil

Pillar II:

NC = not concerned (no M11 support in NL)

- = no budget under Priority 4

Colour code for the planned budget for RDP measures is based on the ESQ1 analysis (national planned budget allocated under Priority 4 and Focus Area 5A, 5D and 5E):

	Relatively low planned budget / Utilised Agricultural Area		Relatively medium planned budget / Utilised Agricultural Area		Relatively high planned budget / Utilised Agricultural Area
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Legend for the executed budget (in % of the planned budget for the measure under P4 and FA 5A, 5D and 5E) from AIR data:

+ = Low (0-15%)	++ = Medium (15-30%)	+++ = High (>30%)	(-) = no executed budget under P4 and FA 5A, 5D and 5E
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The table shows that, despite the various contexts of RBD selected for case-study, the same pressures arise from the agricultural sector. In most RBDs, nutrient and chemical pollution is generated by livestock farming, cereals and fruit/vegetables/flowers crops. In many cases, the farming practices also altered the soil structure and increased erosion and runoff. The analysis of direct payments (Pillar I) and Farm Net Value Added reveals that three types of farms are depending on CAP support; however the ratio varies significantly between the sectors and the Member States:

- The farms with a high share of permanent grasslands, fallows or temporary grasslands are among the most dependent on direct payments in almost all the RBDs studied. These farms are specialised in livestock rearing and often benefit from VCS, depending on the type of livestock produced.
- The farms growing mainly cereals other than wheat and maize, and to a lesser extent farms specialised in wheat or maize cultivation, are also receiving high Pillar I support as compared to their FNVA in almost all the RBDs studied. Cereals or protein crops are supported by VCS in six out of the ten RBD studied.
- Mixed holdings characterised by multiple crops in their UAA are also significantly dependent on Pillar I support in the RBDs studied, except in Southern Appenines (IT).

The analysis of the Pillar II support shows that farms with grasslands and fallows were generally those with the relatively highest share of PII support on FNVA. Few other farm types rely on PII support, and specific cases were identified in Austria (other cereals and protein crops – 103%), Finland (mixed holdings – 99% and other cereals and protein crops – 92%) and Poland (maize – 255% and other cereals and protein crops – 72%). PII support can be constituted from payments under different RDP measures, notably M10 and M11, which were significantly implemented in the RBDs observed.

Indeed, the RDP measures implemented were quite similar in the various RDBs. Among measures targeting Priority 4 and FA 5E and 5D, M10 'AECM' was the most implemented, with significant executed budget over 2015-2017, followed by M11 'Organic farming' and M4 'Investments support'. Other RDP measures implemented (M8, M16, M19) registered low executed budget in 2017. M1 and M2 were little used in all the RBD studied.

The few indicators available at the scale of the RBD do not make it possible to determine clear trends among the agricultural pressures, the CAP measures implemented, and the outcomes observed. FADN analysis indicates the following between 2012/2013 and 2015/2016:

- Phytosanitary product expenditures increased by 11 to 46% in five RBDs (AT, DE, ES, FR, HR) and decreased from 3% to 18% in five others (FI, IT, NL, PL, RO).
- Fertiliser expenditures increased by 23% in the Olt RBD (RO), slightly increased (between 1% and

6%) in three RBDs (AT, ES, NL), remained stable in the Danube RBD (HR) and decreased from 1.2% to 31% in other RBDs (DE, FI, FR, IT, PL).

- The share of organic farms decreased significantly in four RBDs, from 9% to 95% (AT, FI, PL, RO), but remained quite stable in six RBDs (DE, ES, FR, HR, IT, NL).
- The share of permanent grasslands decreased from 9% to 27% in three RBDs (AT, ES, RO) remained stable in the Rhine RBD (DE) and increased in six RBDs (FI, FR, HR, IT, NL, PL).

These results tend to indicate that the policy implemented, together with the influence of other factors, contributed to alleviate agricultural pressures (i.e. reduction of the fertilisers and phytosanitary products expenditures) in three RBDs (KSS (FI), Southern Appenines (IT) and Vistula (PL)), and to a lesser extent (i.e. reduction of phytosanitary product expenditures or fertiliser expenditures) in five others (Rhine (DE), Rhine (FR), Danube (HR), Rhine (NL) and Olt (RO)).

## 5.5.4 EFFECTS OF WATER-RELEVANT CAP MEASURES ON FERTILISERS AND PESTICIDES USE

### 5.5.4.1 Effectiveness on fertilisers and pesticides use by crop types

The two tables below show that the highest expenditures for fertilisers and pesticides per hectare (highlighted in red) are observed for flowers and vegetables and to a lesser extent for fruits, vineyard and Cereals, Oilseeds and Protein crops (COPs). However, for this latter, not all Member States have high pesticide expenditures. This concerns all the case-study Member States, but Austria and Croatia recorded a lower level of expenditures. In Spain, fertiliser and pesticide expenditures are relatively low except for farms with a significant share of their area dedicated to other crops.

The lowest expenditures in fertilisers and pesticides per hectare (highlighted in green) are observed on permanent grasslands. In farms specialised in fallow and temporary grasslands, i.e. with a significant share of their area dedicated to these covers, pesticide expenditures are low, but the level of fertilisation is sometimes quite significant (PL, FR), which might show that temporary grasslands are sometimes managed as usual crops to optimise grass yield.

**Table 44: Fertilisation expenditures (€/ha) per crop type in CS MS - average 2015-2016**

	AT	DE	ES	FR	FI	HR	IT	NL	PL	RO
Wheat	186	185	105	239	138	129	142	182	185	91
Maize	192	134	371	236	n.a.	171	227	88	232	89
Other COP	71	134	111	209	126	132	104	246	110	82
Vegetables	n.a.	118	136	2,538	15,497	418	1,223	1,238	1,756	405
Flowers	n.a.	3,454	n.a.	12,750	11,050	n.a.	16,346	2,618	n.a.	2,979
Fallow and temporary grassland	n.a.	n.a.	77	115	99	74	94	n.a.	258	49
Other arable	n.a.	290	229	599	n.a.	n.a.	109	n.a.	169	83
Permanent grassland	15	60	21	57	n.a.	33	24	121	77	46
Fruit	240	119	n.a.	463	n.a.	264	269	444	165	153
Vineyard	39	118	136	298	n.a.	257	243	n.a.	n.a.	141
Other permanent	n.a.	60	n.a.	2,398	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Other and mixed	229	923	5,577	1,264	103	315	2,610	1,709	1,248	211

Source: Alliance Environnement from FADN data

**Table 45: Pesticide expenditures (€/ha) per crop type in CS MS - average 2015-2016**

	AT	DE	ES	FR	FI	HR	IT	NL	PL	RO
Wheat	118	187	61	213	45	61	76	268	76	43
Maize	99	94	113	119	NA	67	132	108	68	49
Other COPs	42	121	59	176	38	51	72	327	30	33
Vegetables	n.a.	685	189	1,087	5,886	289	900	1,182	451	444
Flowers	n.a.	3,173	n.a.	2,203	941	n.a.	13,483	5,833	n.a.	3,434
Fallow and temporary grassland	n.a.	n.a.	78	55	6	15	55	n.a.	83	13
Other arable	n.a.	481	178	188	n.a.	n.a.	51	n.a.	52	27
Permanent grassland	4	17	11	21	n.a.	10	16	28	16	32
Fruit	751	924	n.a.	624	n.a.	234	310	1,238	257	381

	AT	DE	ES	FR	FI	HR	IT	NL	PL	RO
Vineyard	362	685	189	729	n.a.	686	458	n.a.	n.a.	233
Other permanent	n.a.	17	n.a.	1,079	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Other + mixed	244	916	4,005	425	31	225	1,312	2,457	402	1,275

Source: Alliance Environnement from FADN data

Data on expenditure per crop type are then put into perspective with the results of ESQ 3 on the effects of CAP measures on change in land uses and management practices, which are synthesised in the table below.

**Table 46: Synthesis of the effectiveness of water-relevant CAP instruments and measures to foster land uses and farming practices beneficial for reducing fertilisers and pesticides used**

CAP instruments and measures	DE	ES	FR	HR	IT	NL	AT	PL	RO	FI	Total
<b>Permanent grassland</b>	9	6	9	6	6	6	6	6	2	9	65
<b>Crop diversification</b>	6	6	3	6	6	2	9	9	6	6	59
<b>ESPG</b>	6	6	3	3	6	3	3	3	6	3	42
<b>M10 (practices)</b>	4	4	3	NA	2	2	9	2	2	9	37
<b>M11</b>	3	3	3	3	3	-	6	3	3	6	33
<b>EFAs (practices)</b>	6	0	6	2	2	6	1	4	3	0	30
<b>EFAs (land use)</b>	3	6	3	6	2	2	1	2	3	1	29
<b>M10 (land use)</b>	4	0	3	NA	0	0	6	2	2	6	23
<b>M8</b>	3	3	3	3	3	0	3	3	0	0	21
<b>M15</b>	3	3	0	0	3	0	3	0	0	0	12
<b>M4</b>	0	1	0	1	2	0	0	2	0	1	7
<b>M12</b>	2	1	0	0	1	0	1	0	0	0	5
<b>Total</b>	49	39	36	30	36	21	48	36	27	41	

Source: ESQ3 results

This reveals that measures with the highest positive effects on agricultural practices impacting fertiliser and pesticide use (i.e. cross-compliance, greening measures) do not systematically apply to sectors that spend the highest amounts in fertilisers and pesticides (flowers, fruits, vegetables and vine). Indeed, these sectors are not eligible for direct payments in all Member States (DE, FR, PT, SI, UK-NI, see Box 5 in ESQ 3). In France, Italy and to a lesser extent in the Netherlands, the FADN analysis reveals that the flowers sector has significantly high levels of fertiliser and pesticide expenditures and relatively significant support under Pillar I and/or Pillar II. In these sectors, CAP measures and instruments could be better oriented toward reduction in fertilisers and pesticides. This is also the case for instance in the fruits and vegetables sector in France and Spain, although Operational Programmes of Producers Organisations in this sector are supposed to support actions to improve water quality. Under Pillar II, M11 and M4 may be implemented in these sectors, but their uptake is too low to have significant effect on fertiliser and pesticide expenditures.

On the other hand, in the COP crops sector, cross-compliance and greening measures seem to impact fertilisers and pesticides use, except in the Member States where they were assessed as not effective enough to influence positive farming practices. Hence, in France and the Netherlands, where high expenditures were registered in the COP sectors, specific measures were deemed as weak (e.g. diversification, ESPG, M10). These measures also seem to have a relatively low impact in other mixed farms in Spain, with high fertiliser and pesticide expenditures. In this Member State, specific measures beneficial for the reduction of inputs use were assessed as less effective (e.g. EFAs, M10, M11).

However, results in the table below on the respective share of Pillar I and Pillar II support on the farms' net value added (FNVA) show that the permanent grassland measure may play a significant role in AT, PL, DE and HR, considering the share of direct payments on the FNVA of farms with more than 50% of their UAA in permanent grasslands. However, other Pillar 2 measures also seem important for the maintenance of such holdings, especially in AT and FI.

**Table 47: Share of CAP payments on farm net added value (%) for extensive grazing systems in case-study Member States. Average 2015-2016**

	AT	DE	ES	FR	FI	HR	IT	NL	PL	RO
<b>Pillar I payments</b>										
Fallow and temporary grassland	101	5	25	6	105	89	7	27	6	66
Permanent grassland	138	64	39	8	28	71	11	9	83	27
<b>Pillar II payments</b>										
Fallow and temporary grassland	157	1	2	3	84	22	1	0	1	1
Permanent grassland	245	32	5	21	75	36	8	1	20	1

Source: Alliance Environnement from FADN data

#### 5.5.4.2 Effectiveness on fertiliser and pesticide use in organic and conventional farms

The table below shows a clear effect of organic farming on the cost and presumably the quantity of pesticides used. Only Spain has more pesticide expenditure on organic farms than on conventional ones. Spain experts attribute this result to more frequent treatments because of lower efficiency and to higher prices of organic authorised pesticides. Conversely, in other countries (NL, PL, FI), the expenditures in pesticides are reduced in organic farming by more than a factor of ten.

Fertiliser expenditures are reduced on organic farms by more than half in most of the Member States, and by more than ten times in Poland and Finland. Given the fact that organic fertilisers are often more expensive than mineral ones, it can be concluded that the quantity of fertilisers bought in organic farms is much smaller than in conventional farms.

**Table 48: Fertiliser and pesticide expenditures (€/ha) of organic and non-organic farmers in case-study Member States - average 2015-2016**

	AT	DE	ES	FR	FI	HR	IT	NL	PL	RO
<b>Pesticide expenditures</b>										
Conventional farming	84	206	286	266	240	107	364	828	63	65
Organic farming	9	30	310	130	4	39	177	58	1	6
<b>Fertiliser expenditures</b>										
Conventional farming	88	209	315	412	764	164	401	610	167	91
Organic farming	12	41	213	165	20	57	185	110	14	14

Source: Alliance Environnement from FADN data

As a matter of fact, it is among the Member States with the most significant difference between organic and conventional levels of fertiliser and pesticide expenditures that M11 was the most effective in fostering practices beneficial for water quality (see ESQ 3 synthetic results above) (i.e. AT, FI).

In addition, the weight of Pillar II support in farms' margin is particularly significant for organic farms in Austria and Finland (see table below). In the Netherlands, M11 is not implemented, and organic farming is supported under a national programme. In these Member States, and to a much lesser extent in Germany and Croatia, M11 thus supports the maintenance of organic farms that may not be able to maintain their activity without the support.

**Table 49: Share of Pillar II payments on FNVA for organic and non-organic farms in case-study Member States - Average 2015-2016**

	AT	DE	ES	FR	FI	HR	IT	NL	PL	RO
Conventional farming	39	1	2	5	4	14	2	0	5	1
Organic farming	112	23	3	4	227	46	12	1	n.a.	8

Source: Alliance Environnement from FADN data

#### 5.5.5 EFFECTS OF WATER-RELEVANT CAP MEASURES ON POLLUTANTS TRANSFERRED BY RUNOFF OR LEAKAGE INTO WATERBODIES

In section 2.1.3, the following practices have been highlighted as beneficial for alleviation of the transfer of pollutants by runoff and leakage into waterbodies:

- In the category of land uses:
  - Implementation of buffer or riparian protection;
  - Areas dedicated to wetland, fallows, forage, permanent grassland, agroforestry and forest, nitrogen-fixing crops;
  - Creation or maintenance of landscape features or strips on fields; as well as introduction of short-rotation coppice;
- In the category of livestock or crops management:
  - Crop residues on soil;
  - Precision irrigation and use of more efficient equipment;
  - Prevention of livestock trampling along watercourses;
  - Promotion of transhumance;
  - Biological control of pests;
  - Suitable equipment for manure management;
  - Precision farming and more efficient equipment for fertilisers and pesticides;
  - Appropriate disposal of hazardous substances.

The effects of the water-relevant CAP instruments and measures on the above-mentioned practices, analysed in ESQ 3, are synthesised in the table below.

**Table 50: Synthesis of the effectiveness of water-relevant CAP measures to foster land use and practices beneficial for reducing pollutants transferred by runoff and leakage**

CAP instruments and measures	DE	ES	FR	HR	IT	NL	AT	PL	RO	FI	Total
GAEC 5	9	6	9	6	6	9	9	9	9	6	78
GAEC 3	9	6	9	6	6	6	6	9	6	9	72
GAEC 7	9	9	6	9	9	3	9	6	6	3	69
GAEC 1	9	9	3	6	6	9	3	9	6	9	69
GAEC 4	9	9	9	6	3	6	6	6	3	9	66
Permanent grassland	9	6	9	6	6	6	6	6	2	9	65
GAEC 6	6	6	6	6	6	6	6	6	9	6	63
SMR 1	9	4	4	2	4	6	9	9	6	9	62
ESPG	6	6	3	3	6	3	3	3	6	3	42
M10 (practices)	4	4	3	NA	2	2	9	2	2	9	37
M10 (land use)	4	0	3	NA	0	1	6	2	2	6	24
M11	3	3	3	3	3	-	6	3	3	6	33
EFAs (practices)	6	0	6	2	2	6	1	4	3	0	30
EFAs (land use)	3	6	3	6	2	2	1	2	3	1	29
M8	3	3	3	3	3	0	3	3	0	0	21
M15	3	3	0	0	3	0	3	0	0	0	12
M4	0	1	0	1	2	0	0	2	0	1	7
M12	2	1	0	0	1	0	1	0	0	0	5
<b>Total</b>	<b>103</b>	<b>82</b>	<b>79</b>	<b>65</b>	<b>70</b>	<b>65</b>	<b>87</b>	<b>81</b>	<b>66</b>	<b>86</b>	

Source: ESQ3 results

Cross-compliance entails many GAECs that require the implementation of farming practices beneficial for alleviation of pollutants transferred by runoff and leakage (e.g. forbidden ploughing of sloped areas, buffer strips, proper disposal of pollutants, soil coverage, etc.). Greening measures can also make a favourable contribution, notably via permanent grasslands (including ESPG) and EFAs. However, this latter was assessed as less effective in ESQ 3, because of the low share of land under EFAs beneficial for water quality in the Member States studied, e.g. catch-crops, N-fixing crops, buffer strips (especially IT, AT and FI).

In order to analyse leaching and runoff of fertilisers and pesticides, the WISE indicator related to diffusion of agricultural pollution of surface and groundwater bodies was used. When data are confronted to the proportion of waterbodies impacted by diffuse agricultural pollution (table below), it is not possible to identify any significant effect of the measures. Indeed, Member States where the concerned measures were implemented with the best effectiveness (DE, FI, AT, ES, PL) are not those where the case-study river basin has the lowest number of waterbodies polluted: case-study river basins with the worse indicators in terms of share of bodies polluted (AT, ES, FR, HR, IT, NL) are sometimes found in Member States where related CAP instruments/measures reached good effectiveness in terms of changes in practices. This may be due to the latency period for CAP instruments/measures

implemented since 2014 being insufficient to fully deliver their expected indirect effects on pollutants transferred by runoff and leakage. Another hypothesis is that good practices supported by the CAP instruments/measures are not sufficient to really prevent pollutants from the agricultural sector from being transferred into waterbodies.

**Table 51: Changes in diffuse agricultural pollution between 2010 and 2016\***

CS River Basin	Impacted surface water bodies		Impacted groundwater bodies	
	2016	Difference in the % of polluted bodies	2016	Difference in the % of polluted bodies
<b>Danube (AT)</b>	18.3%	n.a.	100%	+96.9%
<b>Rhine (DE)</b>	41.4%	n.a.	37.20%	n.a.
<b>Ebro (ES)</b>	24.8%	+15.6%	67.60%	n.a.
<b>KSS (FI)</b>	46.5%	+3.5%	7.1%	-12.6%
<b>Rhine (FR)</b>	60.4%	n.a.	66.70%	n.a.
<b>Danube (HR)</b>	59.7%	n.a.	5%	n.a.
<b>S. Apennines (IT)</b>	68.4%	+35.1%	55.7%	+53.7%
<b>Rhine (NL)</b>	n.a.	n.a.	72.7%	n.a.
<b>Vistula (PL)</b>	17%	+16%	4.3%	-4.6%
<b>Danube (RO)</b>	12.1%	n.a.	10.5%	-2.9%

\* Changes are trends in the proportion of tested SWBs impacted by a pressure. This calculation has been made considering the difference between the total number of tested waterbodies in 2010 and 2016 (all data have been turned into percentages before comparison).

Source: Alliance Environnement from WISE data

## 5.5.6 EFFECTS OF WATER-RELEVANT CAP INSTRUMENTS AND MEASURES ON SOIL AND BANK EROSION

The practices listed in the previous part as beneficial for alleviation of pollutants transferred by runoff and leakage also contribute to the reduction of soil and bank erosion. The effects of the water-relevant CAP instruments and measures on these practices have been assessed in the previous part.

The available data on the proportion of surface water bodies impacted by erosion do not make it possible to draw conclusions on the indirect effect of water-related instruments and measures on erosion. Two different sets of data are presented below (WISE and LUCAS). LUCAS data shows that signs of erosion are currently more observed in southern Europe than in the north. Erosion is particularly prominent in Spain and Greece but also to a lesser extent in France, Germany, Bulgaria, Hungary and Czechia.

**Table 52: Changes in the share of surface water bodies impacted by erosion between 2010 and 2016\***

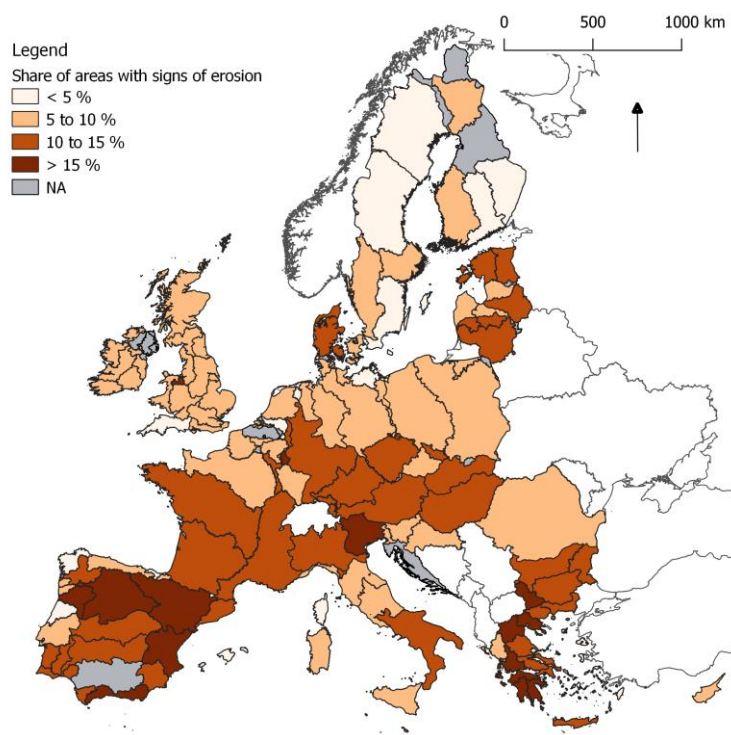
CS River Basin	Physical alteration from agriculture		Hydrological alteration from agriculture	
	2016	Difference in the % of impacted water bodies	2016	Difference in the % of impacted water bodies
<b>Danube (AT)</b>	n.a.	n.a.	n.a.	n.a.
<b>Rhine (DE)</b>	46.1%	n.a.	0.6%	n.a.
<b>Ebro (ES)</b>	11.4%	n.a.	0.1%	n.a.
<b>KSS (FI)</b>	2.2%	n.a.	n.a.	n.a.
<b>Rhine (FR)</b>	n.a.	n.a.	n.a.	n.a.
<b>Danube (HR)</b>	39.3%	n.a.	0%	n.a.
<b>S. Apennines (IT)</b>	n.a.	n.a.	n.a.	n.a.
<b>Rhine (NL)</b>	n.a.	n.a.	n.a.	n.a.
<b>Vistula (PL)</b>	n.a.	n.a.	n.a.	n.a.
<b>Danube (RO)</b>	0.1%	n.a.	0.1%	n.a.

\* Changes are trends in the proportion of tested SWBs impacted by a pressure. This calculation has been made considering the difference between the total number of tested waterbodies in 2010 and 2016 (all data have been turned into percentages before comparison).

Source: WISE data



**Figure 16: Observed signs of erosion in 2018 in EU28**



Source: Alliance Environnement compilation from LUCAS data

Whatever the data source considered, no clear impact of the measures on erosion could be found. Indeed, in case-study river basins that are relatively highly impacted by erosion (e.g. DE, ES, AT), the CAP measures implemented were assessed as effective in fostering land uses and farming practices beneficial to reduce soil and bank erosion. This is particularly true for Germany, where measures seem to be effective, but where erosion reaches a relatively high level. As for prevention of pollutant runoff and leakage, this may be due to the latency period for CAP measures implemented since 2014 being insufficient to fully deliver their expected indirect effects on erosion.

### **5.5.7 REPLY TO ESQ 4**

ESQ 4 examines the effects of water-relevant CAP measures on the five pressures related to water quality. The effects on the level of concentration of pollutants in groundwater are treated in ESQ 5 on water quantity.

CMEF results show that, at EU level, less than 9% of agricultural land was concerned by Pillar II contracts related to fertilisers and pesticides management, i.e. with direct effects on their use as well as indirect effects on runoff or leakage.

The few indicators available at the scale of the RBDs do not make it possible to determine clear trends among the agricultural pressures, the CAP measures implemented, and the outcomes observed in the studied RBDs. However, the analysis tends to indicate that the policy implemented, together with the influence of other factors, contributed to alleviate agricultural pressures (i.e. reduction of the fertiliser and phytosanitary product expenditures) in three RBDs (KSS (FI), Southern Appenines (IT) and Vistula (PL)), and to a lesser extent (i.e. reduction of phytosanitary product expenditures or fertiliser expenditures) in five others (Rhine (DE), Rhine (FR), Danube (HR), Rhine (NL) and Olt (RO)).

Regarding fertiliser and pesticide use, measures with the highest positive effects on beneficial agricultural practices (i.e. cross-compliance, greening measures on crop diversification and EFAs) do not systematically target sectors that spend the highest amounts in fertiliser and pesticide (i.e. flowers, fruits, vegetables and wine) because these sectors are not eligible for direct payments in all Member States (DE, FR, PT, SI, UK-NI, see box 5 in ESQ 3). In these sectors, other measures and instruments of Pillars I and II could be better oriented toward fertiliser and pesticide reduction, as it is the case for Operational Programmes of Producers Organisations in the fruits and vegetables sector in FR and ES.



On the other hand, in the COP crops sector, cross-compliance and greening measures seem to impact fertiliser and pesticide use, except in the Member States where they were assessed as not effective enough to influence positive farming practices (FR, NL). The direct payments, and notably the permanent grassland measure, played a significant role in AT, PL, DE and HR for the maintenance of holdings specialised in extensive grazing, which have on average low expenditures in fertilisers and pesticides (in conjunction with Pillar II support in AT and FI). Finally, a clear effect of organic farming on the expenditures and presumably the quantity of fertilisers and pesticides used was also identified, especially in AT, FI, NL, PL, as well as in DE and HR to a lesser extent. By supporting the profitability of organic farms, M11 is effective for protecting water quality, but its impact could be more significant if implemented to a greater extent.

Regarding diffuse agricultural pollution, no significant effect of the measures on pollutants transferred by runoff and leakage were identified, whatever the river basin concerned. This may be due to the latency period for CAP instruments/measures implemented since 2014 being insufficient to fully deliver their expected indirect effects on pollutants transferred by runoff and leakage, if any.

Regarding soil and bank erosion, no clear impact of the water-related CAP instruments/measures were found. Again, this may be due to the latency period for CAP instruments/measures implemented since 2014 being insufficient to fully deliver their expected effects on erosion. In any case, it is relevant to underline that less than 9% of agricultural land was concerned by Pillar II contracts related to soil management and/or erosion prevention.

## **5.6 EFFECTIVENESS - ESQ 5: QUANTITY OF WATER - TO WHAT EXTENT AND IN WHAT WAY HAVE THE CAP INSTRUMENTS AND MEASURES ADDRESSING SUSTAINABLE MANAGEMENT OF NATURAL RESOURCES AND CLIMATE ACTION AFFECTED WATER MANAGEMENT, PROTECTION AND USE BY AGRICULTURE A) BY AGRICULTURAL PRACTICES AND FARM TYPES AND B) BY REGIONS OR RIVER BASINS?**

### **5.6.1 UNDERSTANDING OF THE QUESTION AND METHODOLOGICAL APPROACH**

While ESQ 3 provided an assessment of the effects of water-relevant CAP measures on farming practices, this ESQ considered the effects of CAP measures on pressures related to water quantity, i.e. the effect of induced farming practices by CAP instruments and measures addressing the sustainable management of natural resources (see Figure 3).

As described in section 2.1.2.2, farming practices lead to three types of pressures on water quantitative status through:

- water abstraction in soil or waterbodies,
- reduced water-retention capacity of soil,
- and hydrological and morphological alterations.

The effects on hydrological and morphological alterations have been treated in ESQ 4, which considered the effect of measures on soil and bank erosion.

Changes in the level of pressure, observed by river basin or by agricultural practice and farm type depending on data availability, were compared to the results of ESQ 3 on the effects of water-relevant CAP measures on farming practices.

CMEF result indicators were used to assess the overall effect of Pillar II measures on water abstraction; however, they were not available at the RBD level. The FADN made it possible to assess the change in irrigated area in the studied RBDs and the area irrigated by crop types.

By providing data on farms' irrigated area, as well as on CAP support received, FADN data make it possible to investigate the effects of support depending on farm types and other farming practices implemented. As detailed in the box below, instead of the commonly used definition of Types of Farming (see also Box 2 on FADN in section 4.6.2), a derived approach of 'crop types' is used. Furthermore, results have to be understood carefully, as the irrigated area is only a proxy of the quantity of water used.

### Box 7: Precautions taken in the use of FADN data to assess the quantity of water used

It should be noted that the figures show actual area irrigated and not irrigable area, which is often higher. Moreover, the annual irrigable area can vary between years. To hinder the effect of interannual variability, 2015-2016 mean figures are presented in the section below.

In order to test the reliability of the results, the average percentage of irrigated area has been calculated using both FADN and Eurostat data in 2016. The results are presented below. They show that these figures are very similar between the two databases, except for Germany, for which data are missing in FADN. Moreover, no specific trend is observed between the two databases, since data are alternatively over or underestimated depending on the Member State considered.

**Table 53: Share of irrigated area in CS MS according to FADN and Eurostat 2016 data**

% irrigated area	FADN 2016	EUROSTAT 2016	Difference
AT	0.5	1.4	0.9
DE	0	2.7	2.7
ES	15.1	13.2	-1.9
FI	0.03	0.4	0.37
FR	5.7	4.9	-0.8
HR	0.8	1.0	0.2
IT	22.3	20.2	-2.1
NL	7.5	11.2	3.7
PL	1.1	0.9	-0.2
RO	0.6	1.9	1.3

Sources: FADN and Eurostat (Online data code: [aei\\_ef\\_ir](#))

### 5.6.2 ANALYSIS IN CASE-STUDY RIVER BASIN DISTRICTS

The table below synthesises the information collected in the RBDs studied, on specific issues associated with agricultural pressures on water quantity, the CAP measures implemented and the potential observed outcomes.

**Table 54: Effects of CAP instruments and measures in case-study RBDs on agricultural pressures affecting water quantity**

RBD	Agricultural pressures	Pillar I							Pillar II					Observed outcomes		
		Fallow and grasslands <sup>2</sup>		Cereals <sup>2</sup>		Other holdings <sup>2</sup>		VCS	RDP measure planned budget <sup>3</sup> and share of executed budget in the period 2014-2017							
		PI /FNVA	PII /FNVA	PI /FNVA	PII /FNVA	PI /FNVA	PII /FNVA		M1	M2	M4	M10	M16	Change in total irrigated area <sup>4</sup>	2015 WEI+ (change 2010-2015) <sup>5</sup>	Soil org. matter <sup>6</sup>
Rhine (DE)	-	PG 88%	PG 42%	COP 50%, wheat 45%, maize 39%	-	Mixed 46%	-	-	-	-	-	-	-	NA	18% (+8%)	+3.4%
Ebro (ES)	A	PG 331%	PG 31%	COP 103%, wheat 58%	-	Mixed 61%	-	BV, SG, MK	-	-	+	-	+	+12%	47% (+9%)	+7.1%
Rhine (FR)	A, H	PG 104%	Fallow/TG 104%	Maize 171%	-	Mixed 52%	-	CL, MK, SG, PC	-	-	-	-	-	-4%	18% (+8%)	Stable
Danube (HR)	A, R	Fallow/TG 102%	PG 32%, Fallow/TG 23%	COP 114%, maize 104%	COP 33%	Mixed 122%	Mixed 21%	BV, MK, PC, SB	-	-	-	-	-	-28%	7.3% (+4.6%)	NA
Southern Apennines (IT)	A, H	-	-	Wheat 126%, COP 40%	-	Fruits 32%	-	BV, MK, OL, CL	-	-	++	-	-	+108%	23% (+13.7%)	Stable
Rhine (NL)	H, R	Fallow/TG 23%	-	Maize 29%	-	Mixed 43%	-	SG, BV	-	-	-	-	-	+3%	18% (+8%)	+6.7%
Danube (AT)	A	PG 138%	PG 245%	COP 137%, wheat 52%, maize 42%	COP 103%, wheat 21%	Mixed 47%	Mixed 23%	BV, SG	++	-	+	-	-	+24%	7.3% (+4.6%)	+5.2%
Vistula (PL)	A	PG 71%	PG 18%	Maize 4,184%, COP 448%, wheat 102%	Maize 255%, COP 72%	Mixed 125%	Mixed 13%	BV, MK, SB, PC	-	-	-	-	-	+6345%	14% (+5%)	-4.3%
Olt (RO)	A, R	Fallow/TG 66%, PG 27%	-	Wheat 122%	-	Mixed 30%	-	MK, PC, SG, SB	-	-	+	-	-	-11%	7.3% (+4.6%)	-4.8%
KSS <sup>1</sup> (FI)	H	Fallow/TG 111%	Fallow/TG 104%	COP 60%	COP 92%	Mixed 67%	Mixed 99%	BF, MK	-	-	-	-	-	NA	3.2% (-2%)	-9%

Source: CMEF indicators, AIR data, FADN, EDC

<sup>1</sup> Kokemäenjoki-Saaristomeri-Selkämeri.

<sup>2</sup> Calculation of the PI and PII payments over the Farm Net Value Added (FADN data). Farm types correspond here to farms with more than 50% of their UAA allocated to the given crop.

<sup>3</sup> Planned budget under FA 5A and UAA: national for all case studies except for DE (North Rhine-Westphalia), ES (Aragon), FR (Alsace) and IT (Puglia) – AIR data.

<sup>4</sup> Change in irrigated area between 2012-2013 and 2015-2016 (FADN data).

<sup>5</sup> The WEI+ is available at the scale of the international river basin (e.g. Danube).

<sup>6</sup> Soil organic matter: national trends in the mean organic carbon content in arable land between 2012 and 2015 (CMEF output indicators).

## Legend:

Quantitative issues:

A= Water abstraction

H= Hydromorphological alteration

R= Reduced water retention in soil

- = no quantitative issues identified

Pillar I:

PG = Permanent grassland; TG = Temporary grassland;

COP = Cereals, oilseeds and protein crops

(-) = not significant (<10%)

BV = Beef and veal; MK = milk and milk products;

SG = Sheepmeat and goatmeat; PC= Protein crops;

CL= Cereal; SB= Sugar beet; OL= Olive oil

Pillar II:

NA = no information available

- = no budget under Focus Area 5A

Legend for the planned budget under Focus Area

5A

	Relatively low planned budget / Utilised Agricultural Area		Relatively medium planned budget / Utilised Agricultural Area		Relatively high planned budget / Utilised Agricultural Area
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Legend for the executed budget (in % of the planned budget for the measure under P4 and FA 5A, 5D and 5E) from AIR data:

+ = Low (0-15%)	++ = Medium (15-30%)	+++ = High (>30%)	(-) = no executed budget under P4 and FA 5A, 5D and 5E
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The table shows that the agricultural pressures on water quantity vary among the RBDs studied. However, abstraction remains the most common pressure identified during the case studies (in 7 out of 10 Member States), mostly from irrigated sectors such as fruits and vegetables, maize, cereals and horticulture. On agricultural land, hydromorphological alteration comes from water management practices such as drainage (e.g. FI) or flood protection (e.g. NL), and trampling of riverbanks by farm animals (e.g. NL, AT). In some areas, it was also mentioned that hydromorphological alterations arise from intensive arable management (e.g. IT). Another pressure is the decrease of water-retention capacity in soils, due to farming practices leading to soil compaction and loss of organic matter. This concerns arable land, as well as fruits and vegetables (e.g. HR).

As studied in the previous ESQ 4, three types of farms depend on CAP support (grassland farms, cereals specialists and mixed holdings). Nonetheless, variations among Member States exist.

RDP measures implemented to foster efficient use of water were implemented in four out of the ten RBDs studied. Indeed, budget was allocated to Focus Area 5A addressing water-use efficiency only in ES, IT, AT and RO, which face increasing water-availability issues. In Aragon (ES) and Apulia (IT), two RDP measures were implemented under FA 5A: M4 'Investments support' and M16 'Cooperation'. In Austria, M4 and M16 were implemented together with M1 and M2. In Romania, a higher budget was allocated to M4, M2 and also M10. In this Member State, M10 'AECM' supports practices for climate change adaptation, notably the use of more drought-resistant crops or minimum tillage techniques to improve soil moisture.

Few indicators are available on the RBD scale to assess how the agricultural pressures on water quantity have evolved over time and to examine the potential effects of the CAP measures. The FADN made it possible to assess the change in the total area irrigated in each RBD, which has increased in Vistula (PL), Southern Apennines (IT) and Danube (AT), and to a lower extent in Aragon (ES) between 2012/2013 and 2015/2016. The total area irrigated decreased in Danube (HR), Olt (RO) and Rhine (FR). However, the low uptake of M10 in 2017 cannot explain the reduction in irrigated area in Romania, where water-demanding crops might have been replaced by drought-resistant crops. In addition, in Croatia and France, these reductions occurred despite strong dependency on PI support to farm types with more than 50% of their UAA dedicated to maize cultivation.

The data do not make it possible to assess whether the water abstracted for irrigation is used with more efficiency in Member States where RDP measures targeted FA 5A. However, the WEI+ indicators increased in all these areas, indicating worsening water stress situations arising from lower renewable water resources and higher water consumption. Because of lack of homogeneous data (time period and scale considered), it is not possible to establish a correlation between increased soil organic soil matter (associated with increased water-retention capacity) and lower water consumption.

## 5.6.3 EFFECT OF WATER-RELEVANT CAP MEASURES ON WATER ABSTRACTION IN SOIL OR WATERBODIES

### 5.6.3.1 Overall effect of Pillar II measures

The CMEF result indicators are used to assess the overall effect of Pillar II measures on water abstraction. As shown in the table below, the percentage of irrigated land that switched to more efficient irrigation systems was very low in Member States that programmed budget under FA 5A, but reached 5.20% in Romania and 9.23% in the United-Kingdom in 2017.

**Table 55: Pillar II CMEF result indicators related to water abstraction in 2017**

MS	% of irrigated land switching to more efficient irrigation systems (Focus Area 5A)
EL	0.29
ES	1.46
FR	0.03
IT	0.12
CY	6.89
HU	0.01
AT	6.64
RO	5.20
UK	9.63

Note: MS with 0 are not mentioned in the table.

Source: CMEF result indicators

### 5.6.3.2 Effectiveness on water abstraction by crop types

The table below shows that farms with the highest share of irrigated area are in Spain, Italy, and to a lower extent in France. Farms in the Netherlands generally have lower proportions of their area irrigated. However, surprisingly, farms specialised in almost all crop types have a small to medium share of their area irrigated, which is not the case in other non-Mediterranean Member States (AT, FI, PL, RO). This table also shows that the highest rate of irrigation is observed for flower (including in Finland), vegetable and fruits production, as well as for maize, especially in Spain, Italy and to a lower extent France.

**Table 56: Average share of irrigated area in farms' UAA per crop type in case-study Member States (2015-2016)**

	AT	DE	ES	FR	FI	HR	IT	NL	PL	RO
Cereals	0.4	NA	22.3	6.7	0	0.2	20.3	2.8	0.1	0.1
Wheat	0.2	NA	23.2	1.3	0	0.1	4.3	4.4	0	0.1
Maize	1.5	NA	64.6	16.8	NA*	0.3	64.1	2.5	0.1	0.1
Leguminous plants	0.5	NA	13.8	10.9	0	0	20.2	7.6	0.1	0.1
Oleaginous plants	0.4	NA	18.6	2.7	0	0	6.7	NA*	0	0.1
Vegetables	NA*	NA	82.9	28.1	10.5	10.3	46.6	12.1	1	6.1
Flowers	0	NA	80.8	94	99.4	19.8	95.6	13.8	12.2	25.6
Fallow	0	NA	1.8	0.3	0	0	1	0.4	0	NA*
Temporary grassland	0	NA	8.6	0.6	0	0	22.4	5.2	0.1	0
Other arable	0.1	NA	59.7	10.9	0	4.5	9.7	10.4	1.8	0.1
Permanent grassland	0	NA	1.6	0.4	0	0	5.2	2.3	0.1	0
Forest	0	NA	0	0	NA*	0	0	NA*	0	NA*
Fruits	0	NA	50.9	40.4	9	10.1	51.9	12.9	7	1.2
Other permanent	0	NA	NA*	0.1	NA*	NA*	NA*	6	0	NA*

NA\*: less than 15 farms in the sample analysed

Source: Alliance Environnement from FADN data

For total area concerned, the table below shows that Spain, Italy and France are the Member States with the highest irrigated areas. Although French farms specialised in maize only have a relatively small share of their area irrigated, the total area concerned at the Member-State scale is quite significant. The cereals sector represents by far the biggest areas concerned; in France and Italy the sector concentrates

especially on the maize sector, whereas in Spain all cereals are concerned. The vegetables (including in the Netherlands and Poland) and fruits sectors also have significant areas irrigated.

**Table 57: Total irrigated area (x 1,000 ha) per crop type in CS MS (average 2015-2016)**

	AT	DE	ES	FR	FI	HR	IT	NL	PL	RO
Cereals	9	NA	1,030.3	867.4	0	0.5	994.8	12.9	7.3	43.9
Wheat	1.8	NA	320.8	81.3	0	0.1	70.2	3.8	2.1	12.9
Maize	7.1	NA	346.7	761.3	NA*	0.3	668	7.7	3.6	28.4
Leguminous plants	1.6	NA	132.2	65.9	0	0	275	0.4	0.5	5.7
Oleaginous plants	0.2	NA	145	28.9	0	0	8	NA*	0.3	6.1
Vegetables	NA*	NA	451.1	274.5	4.5	3.1	372.9	84.6	84.7	8.3
Flowers	0	NA	3.8	9.1	0.1	0.1	9.4	14.4	0.8	0.1
Fallow	0	NA	4.1	0.6	0	0	3.5	0	0	NA*
Temporary grassland	0	NA	7.8	18.6	0	0	86.6	15.1	0.5	0
Other arable	0.2	NA	277.8	29.5	0	0.1	65	5.2	1.8	0.6
Permanent grassland	0	NA	39.9	27.5	0	0	52.2	16.7	2.2	0
Forest	0	NA	0	0	NA*	0	0	NA*	0	NA*
Fruits	0	NA	462.5	101.3	0.1	4.8	293.8	2.9	50.6	1.7
Other permanent	0	NA	NA*	0.3	NA*	NA*	NA*	0	0	NA*

NA\*: less than 15 farms in the sample analysed

Source: Alliance Environnement from FADN data

These data on irrigated area by crop type were compared to the results of ESQ 3 on the effects of CAP measures on change in land use and management practices, which are synthesised in the table below.

**Table 58: Synthesis of the effectiveness of water-relevant CAP measures to foster land uses and practices beneficial for reducing water abstraction**

Score indicator	DE	ES	FR	HR	IT	NL	AT	PL	RO	FI	Total
<b>GAEC 2</b>	<b>6</b>	<b>9</b>	<b>9</b>	<b>9</b>	<b>9</b>	<b>9</b>	<b>6</b>	<b>9</b>	<b>9</b>	<b>9</b>	<b>84</b>
<b>M4</b>	<b>0</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>12</b>
<b>CMO specific support</b>	<b>N.A.</b>	<b>N.A.</b>	<b>N.A.</b>	<b>N.A.</b>	<b>N.A.</b>	<b>N.A.</b>	<b>N.A.</b>	<b>N.A.</b>	<b>N.A.</b>	<b>N.A.</b>	<b>N.A.</b>
<b>Diversification</b>	<b>0</b>	<b>0</b>	<b>-3</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>-3</b>
<b>Total</b>	<b>6</b>	<b>11</b>	<b>8</b>	<b>11</b>	<b>11</b>	<b>9</b>	<b>8</b>	<b>9</b>	<b>11</b>	<b>9</b>	

Source: ESQ 5 results

The analysis in ESQ 3 showed that water-relevant CAP measures generally failed to deliver effects on water abstraction.

The GAEC 2 was assessed as being effective to guarantee the compliance of farmers with the authorisation order for water abstraction. However, GAEC 2 does not consider whether water abstracted is used efficiently. Then, the percentage of farmers benefiting from M4 support under FA 5A related to water use efficiency was either 0, or inferior to 1 in two of the Member States studied (Italy and Finland). However, no qualitative aspects (e.g. targeted areas, water savings required as part of the *ex-ante* conditionality) enabled assessment of whether the few operations supported were effective to address the water quantity issues at stake. The operational programmes dedicated to specific sectors under the CMO regulation can support operations for better water management. However, no information is available on the operations supported under these schemes. Under the diversification measure, the fact that French maize producers obtained an 'equivalence' prevented the measure from supporting water abstraction reduction in farms growing irrigated maize as single crop.

Then, as demonstrated in ESQ 3, the CAP instruments and measures contributing to raise farmers' awareness and knowledge, or promoting collaborative actions addressing water issues, can contribute to reduce agricultural pressures on water quantity, depending on the way they are implemented in Member States. The analysis showed that effective FAS was implemented in most of the Member States studied and that it contributed to raise farmers' awareness and knowledge on water issues. However, RDP measures on knowledge transfer and advisory services (M1, M2) or promoting collaborative actions addressing water issues (M16, M19) had a limited impact on practices beneficial for water quantity, due to their limited uptake and the fact that the supports sometimes little focused on water-related issues.

Furthermore, water-demanding sectors such as maize, vegetables, fruits and flowers benefit, significantly in the case of maize, from other CAP supports under Pillar I and Pillar II. In these sectors, other measures and instruments could be better oriented towards the reduction of water use.

#### 5.6.4 EFFECTS OF WATER-RELEVANT CAP INSTRUMENTS AND MEASURES ON SOIL RETENTION CAPACITY

In section 2.1.3, the following practices have been highlighted as beneficial for the water retention capacity of soils:

- Maintenance or creation of landscape features or strips on field, including short-rotation coppice;
- Limited ploughing and conservation tillage ploughing;
- Areas dedicated to agroforestry and forest;
- Permanent grasslands, forage, fallows;
- Crop residuals in soil;
- Restoration or maintenance of wetland and floodplains.

The effects of the water-relevant CAP instruments and measures on the above-mentioned practices, analysed in ESQ 3, are synthesised in the table below.

**Table 59: Synthesis of the effectiveness of water-relevant CAP measures to foster land uses and practices beneficial for water retention capacity**

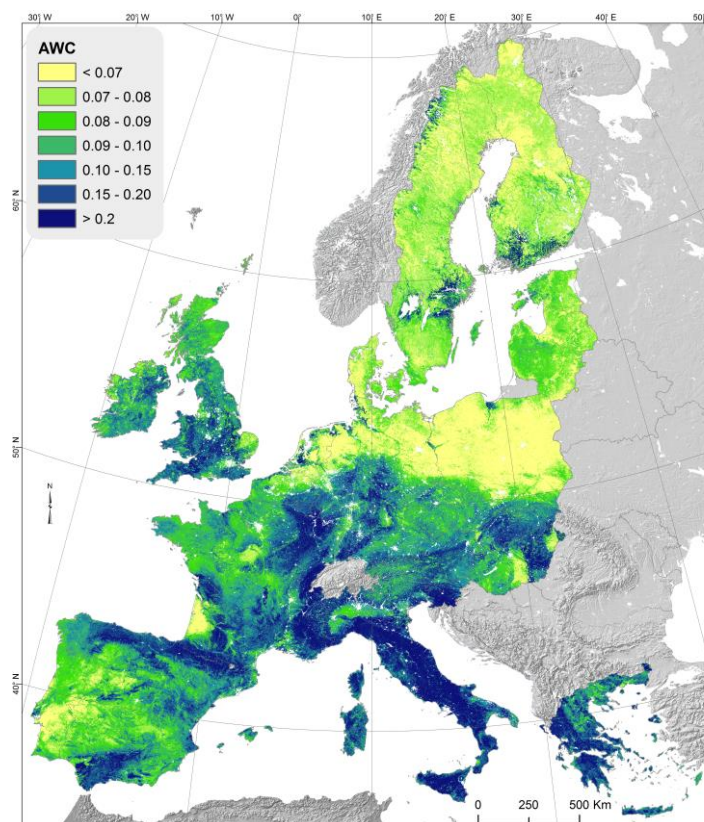
Score indicator	DE	ES	FR	HR	IT	NL	AT	PL	RO	FI	Total
<b>Permanent grassland</b>	9	6	9	6	6	6	6	6	2	9	65
GAEC 7	9	9	6	9	9	3	9	6	6	3	69
ESPG	6	6	3	3	6	3	3	3	6	3	42
EFA (land use)	3	6	3	2	2	2	1	2	3	1	25
M8	3	3	3	3	3	0	3	3	0	0	21
M10 (land use)	4	0	2	NA	0	0	6	0	2	6	20
M15	3	3	0	0	3	0	3	0	0	0	12
Diversification	0	0	-3	0	0	0	0	0	0	0	-3
<b>Total measures impacting land uses</b>	37	33	23	23	29	14	31	20	19	22	
Score indicator	DE	ES	FR	HR	IT	NL	AT	PL	RO	FI	Total
GAEC 5	9	6	9	6	6	9	9	9	9	6	78
GAEC 3	9	6	9	6	6	6	6	9	6	9	72
GAEC 1	9	9	3	6	6	9	3	9	6	9	69
GAEC 4	9	9	9	6	3	6	6	6	3	9	66
GAEC 6	6	6	6	6	6	6	6	6	9	6	63
M10 (practices)	4	4	3	NA	2	1	9	2	2	6	33
EFA (practices)	6	0	6	2	2	6	1	4	3	0	30
M4	0	2	0	2	2	0	0	2	2	2	12
M11	1	1	1	1	1	-	2	1	1	2	11
M12	2	1	0	0	1	0	1	0	0	0	5
<b>Total measures impacting practices</b>	55	44	46	35	35	43	43	48	41	49	

Source: ESQ 5 results

Very few data are available on the water retention capacity of EU soils. The bulk density and soil organic carbon have been used (among other parameters) to estimate the water retention capacity of EU soils in the map below. They show that the water retention capacity is inversely correlated with bulk density. For instance, it is quite high in Bulgaria, Czechia, Greece, northern Spain, eastern France and Italy, whereas it is low in Denmark, Germany, Estonia, Latvia, Lithuania, the Netherlands, Poland, Portugal, Finland and Sweden.



**Figure 17: Available water capacity based on 2009 LUCAS data in EU28**



Source: Ballabio et al., 2016

The absence of updated data does not permit to assess the change in water retention capacity over the 2014-2020 programming period. It is thus not possible to draw a conclusion on the indirect effect of water-related instruments and measures.

However, the comparison of the two analyses above shows that Member States where water retention capacity is low are not always those where instruments and measures were implemented with the highest effectiveness. Germany has implemented the relevant measures with relatively high effectiveness (in particular GAECs and greening measures), but this is not the case for the Netherlands, Poland and Finland. In these Member States, GAECs 4 and 7 as well as ESPG, have not been implemented with sufficient effectiveness to deliver necessary results on the low soil-retention capacity in these Member States.

### **5.6.5 REPLY TO ESQ 5**

ESQ 5 examines the effects of water-relevant CAP measures on water abstraction in soil or waterbodies and water retention capacity of soil. The effects on hydrological and morphological alterations have been dealt with in ESQ 4 which considered the effect of measures on soil and bank erosion.

Few indicators are available at the RBD scale to assess how the agricultural pressures on water quantity have evolved over time and examine the potential effects of the CAP measures. For case-study Member States, the total area irrigated increased in Vistula (PL), Southern Apennines (IT) and Danube (AT), and to a lower extent in Aragon (ES) between 2012/2013 and 2015/2016, but decreased in Danube (HR), Olt (RO) and Rhine (FR). The low uptake of M10 in 2017 cannot explain the reduction in irrigated area in Romania, where water-demanding crops could have been replaced by drought-resistant crops. In addition, in Croatia and France, these reductions occurred despite high dependency on PI support to farm types with water-demanding crops (especially maize). The data do not enable assessment of whether the water abstracted for irrigation is used with more efficiency in Member States where RDP measures targeted FA 5A. However, the WEI+ indicators increased in all these areas, indicating worsening water stress situations arising from lower renewable water resources and higher water consumption.

Regarding water abstraction in soil or waterbodies, CMEF result indicators show that the percentage of irrigated land that switched to more efficient irrigation systems was nearly null at EU level, even though significant in Romania and Poland.

The analysis in ESQ 3 showed that water-relevant CAP measures generally failed to deliver effects on water abstraction. Indeed, GAEC 2 does not consider whether water abstracted is used efficiently and the percentage of farmers benefiting from M4 support under FA 5A was close to '0' in the Member States studied. Furthermore, water-demanding sectors such as maize, vegetables, fruits and flowers benefit – significantly in the case of maize – from other CAP supports under Pillar I<sup>68</sup> and Pillar II.

Regarding soil capacity to increase water retention, the absence of data makes it impossible to draw conclusions on the indirect effect of water-relevant CAP instruments and measures. In any event, Member States where water-retention capacity is low are not always those where instruments and measures were implemented with the highest effectiveness. For case-study Member States, in particular the Netherlands, Poland and Finland, GAECs 4 and 7 as well as ESPGs were not effective enough to influence land uses and farming practices beneficial to the water-retention capacity of soil. On the other hand, Germany seems to have seized the opportunities provided by GAECs and greening provisions to deal with the low soil-retention capacity in the Member State.

In the RBDs studied, the lack of homogeneous data (time period and scale considered) does not make it possible to establish correlation between increased soil organic matter (associated with increased water-retention capacity) and lower water consumption.

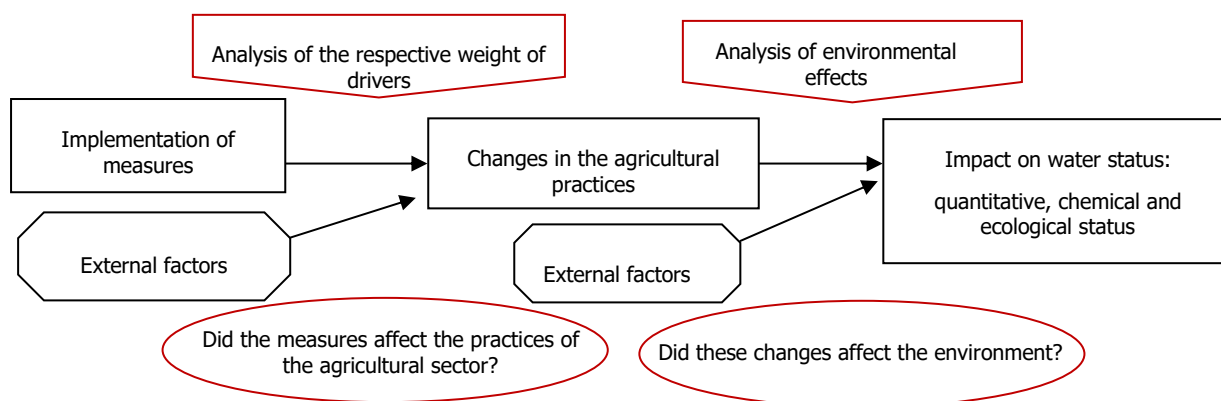
## 5.7 EFFECTIVENESS - ESQ 6: TO WHAT EXTENT WERE THE INDIVIDUAL CAP INSTRUMENTS AND MEASURES FOR SUSTAINABLE MANAGEMENT OF NATURAL RESOURCES AND CLIMATE ACTION SUCCESSFUL OR UNSUCCESSFUL IN RESPECT OF QUALITY AND QUANTITY ASPECTS OF WATER?

*The answer to this question should distinguish between the CAP instruments and measures affecting water directly and indirectly.*

### 5.7.1 UNDERSTANDING OF THE QUESTION AND METHODOLOGICAL APPROACH

This question asks whether the CAP instruments and measures for sustainable management of natural resources and climate action were successful in achieving the specific objectives in relation to water management, with impact on fresh water resources. The general approach to appraise the impact arising from the implementation of the CAP framework is to consider the direct effects of the instruments and measures on agricultural practices and corresponding pressures on water, then to assess how these changes can impact water status (see figure below).

**Figure 18: Approach for the impact assessment of CAP instruments and measures on water status**



Source: Alliance Environnement

<sup>68</sup> Pillar I support can be sector-specific supports under the CMO Regulation (EU) No 1308/2013, but also Basic Payments in Member States where these sectors are eligible.

The reasoning of this ESQ is based on the results from previous ESQs. The effects of water-relevant CAP instruments and measures on agricultural practices were assessed in ESQ 3, the effects of these changes in practices on corresponding water-quality related pressures, by farm types and river basins, in ESQ 4 and finally ESQ 5 provided the same analysis for the water-quantity related pressures. This ESQ thus aims at bringing together the elements of ESQs 3, 4 and 5 and to supplement them with the assessment of the estimated impact on water. The purpose of the ESQ is also to assess whether the CAP could have contributed to the WFD objectives. The table below describes the link between the types of pressures influenced by CAP instruments and measures for sustainable management of natural resources and climate actions, and the corresponding water status affected according to the WFD.

**Table 60: Pressures influenced by the CAP instruments and measures and corresponding water status affected**

Agri-related pressures	Types of SWB status affected	Types of GWB status affected
<b>Nutrient pollution</b>	Chemical and ecological status of SWB	Chemical status of GWB
<b>Agri-chemical pollution</b>	Chemical and ecological status of SWB	Chemical status of GWB
<b>Hydromorphological alterations</b>	Ecological status of SWB	Quantitative status of GWB
<b>Abstraction</b>	Ecological status of SWB	Quantitative status of GWB
<b>Sedimentation</b>	Ecological status of SWB	Quantitative status of GWB

Source: Alliance Environnement

## 5.7.2 EFFECTS OF INDIVIDUAL CAP INSTRUMENTS AND MEASURES ON WATERBODIES' CHEMICAL STATUS (QUALITY)

The qualitative objective of the Water Framework Directive on good chemical status concerns groundwater bodies and surface waterbodies. The results of ESQ 4 and 5 indicated that practices having a positive impact on the quality of waterbodies are the ones that help:

- reduce nutrients, organic wastes and chemicals applied on land;
- decrease risk of soil and bank erosion;
- decrease risk of leaching of nutrients, organic wastes and chemicals;
- decrease risk of runoff of nutrients, organic wastes and chemicals.

### Horizontal measures

The analysis of ESQ 1 and ESQs 3, 4 and 5 indicates that cross-compliance is relatively effective for the objective of good chemical status of waterbodies. In general, all GAECs 1, 3, 4, 5, 6, 7, SMRs 1 and 10 were determined to have positive effects on water quality or at least prevent additional degradation.

Some cross-compliance instruments have direct effects on water quality: GAEC 1 requires the establishment of buffer strips along watercourses, GAEC 3 targets groundwater protection, SMR 1 targets nitrate pollution and SMR 10 addresses water pollution by phytosanitary products. SMR 1, SMR 10 and GAEC 3 have effects on the reduction of inputs (nutrients, organic wastes and chemicals) applied on land and consequently on the reduction of runoff and leaching of those substances and consequently on the chemical status of water (ESQ 3 and 4). GAEC 1 has positive effects on decreasing the risk of soil and bank erosion, and on the reduction of leaching and runoff (ESQ 4), which also affect the chemical status of water.

Other cross-compliance instruments have indirect effects on water quality (e.g. GAEC 4 'minimum soil cover' and GAEC 5 on 'limiting soil erosion' and GAEC 6 on 'maintenance of soil organic matter'). All three instruments influence soil structure and contribute to reducing soil and bank erosion and to decreasing the risks of runoff and leaching, with positive impact on water quality. GAEC 7 on the maintenance of landscape features also indirectly impacts on water quality positively, by improving soil organic matter and soil structure and by preventing erosion, etc. (ESQ 3). Some landscape features, e.g. the maintenance of field margins, have better effects on water quality than others (e.g. North Rhine-Westphalia (DE), Aragon (ES), Austria).

On the other hand, the Farm Advisory System (FAS) aims at helping farmers to better understand and meet certain EU rules (e.g. cross-compliance requirements). The creation of a specific service to implement the Farming Advisory Service was effective in half of the case-study Member States (Aragon (ES), HR, NL, AT and PL). In those Member States (except Poland), the FAS was determined to be effective on water issues, with potential positive effects on water chemical status.

## Pillar I

As for water chemical status, the **greening measures** can positively impact water by maintaining good practices beneficial for water protection. However, greening support does not target sectors with the highest amount of fertiliser and pesticide expenses (i.e. flowers, fruits, vegetables and wine) according to the FADN analysis carried out in ESQ 4.

**Crop diversification** is a natural way of struggling against weeds, pests and disease (Stockdale et al., 2001). It then leads to a reduction of inputs applied on land, with positive impact on water quality (ESQ 3). As mentioned in ESQ 3, the diversification measure had little effect on farmers' practices, despite the fact that it concerns a large share of arable land (76% in 2018). However, the effects of crop diversification on water quality were assessed to be positive in the majority of the case-study Member States (North Rhine-Westphalia (DE), Aragon (ES), Apulia (IT), HR, AT, RO and FI), where it increased the use of N-fixing crops on farms.

**Permanent grasslands** can contribute to the protection of water quality. They help improve soil structure, limit erosion and increase soil organic matter, and they act as buffers retaining pollutants. The effects of the permanent grassland measure on water quality were judged to be positive overall in all case-study Member States (ESQ 3). However, management practices can be detrimental to water quality (e.g. ploughing of grasslands increases the risk of erosion and runoff and reduces their organic matter content). The ESPG measure strictly prohibits any ploughing of permanent grassland. Among case-study Member States ESPG measure effectiveness was assessed to be the highest in Apulia (IT) and Romania. This is explained by that both Member States have a high rate of ESPG on total permanent grassland (46% for IT and 37% for RO) and the fact that Italy is the only case-study Member State to have designated ESPG outside Natura 2000.

**Ecological Focus Areas (EFA)** may have different effects on water quality depending on their type and on management practices. As a general rule, soil vegetation cover and landscape features help decrease the risk of soil and bank erosion and the risks of leaching and of runoff (ESQ 4). Nitrogen-fixing crops and fallow areas are the most widely declared EFAs (32.1%). Legumes are less fertiliser-demanding and help reduce nutrients and organic manure applied on land. Moreover, the ban on pesticides use introduced by the 'Omnibus' regulation guarantees the absence of chemical treatments on EFAs. However, this ban was mentioned by some stakeholders to have led to a reduction in the cultivation of legumes as EFAs in some Member States (e.g. DE, AT). Among landscape features (5.3% of the declared EFA) buffer strips were assessed to be particularly effective as regard water protection<sup>69</sup> (on both quantity and quality). In the case-study Member States, the effects (ESQ 3) of the EFA on water quality were assessed to be rather positive in all case-study Member States and highly positive in Aragon (ES), HR and Apulia (IT).

## Pillar II

**Measures M1 and M2** (supporting knowledge transfer and advisory services) have the potential to influence changes of practices, with positive impacts on both quality and quantity. However, in practice the effectiveness of M1 and M2 was mixed. In terms of water quality, M1 was significantly effective in Croatia and Austria, whereas M2 was significantly effective in Finland (ESQ 3). Their effectiveness was hindered in some case-study Member States (e.g. administrative burden for M1 and M2 in North Rhine-Westphalia (DE) and Alsace (FR); delays in implementation of M2 in Apulia (IT); and water management not being a primary objective of M2 training programmes in Aragon (ES) and Apulia (IT)).

The **investments measure M4** supports some practices with beneficial impact on water quality (e.g. precision farming, suitable equipment for manure management, equipment for water collection). In general, M4 had relatively good uptake (ESQ 3) and was mentioned to have positive effect on water quality in the case-study Member States (AT, ES, FR, HR, IT, NL, PL, RO). However, results from ESQ 3 showed that M4 effects on water quality were very low. This is due to the fact that actions under M4 were rarely targeted under water-relevant focus areas (Priority 4 and Focus Areas 5D and 5E).

**Measure M8 and M15** promote investments and conservation in forest areas respectively. Forest areas have positive effects on water quality. Afforestation improves soil structure and physical protection

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<sup>69</sup> As they can reduce significantly several water issues by limiting the transfer of pesticides, nutrients and sediments to water bodies. This depends on their width and even if reduced water strips can have a significant effect, width of 3 to 5 meters are better to protect effectively water bodies from these pollutions.

limiting soil erosion and runoff. Forests can prevent water pollution by intercepting the pollution pathways through their developed root system (ESQ 4). In ESQ 3 measure M8 was assessed to have impact on water quality in all case-study Member States except NL, RO and FI. M15 was assessed to have mild impact on water quality only in North-Rhine Westphalia (DE), Aragon (ES), Apulia (IT) and Austria. But both measures have great potential on water quality even if the area concerned was limited, as this is largely compensated by the fact that afforested areas will be maintained as forests for decades, which means that effects will be positive and cumulative over the very long term.

The Agri-environment and climate measures (AECM) under **measure M10** have been extensively used by Member States/regions to address water issues (ESQ1). The AECM promotes various practices with positive (direct or indirect) impacts on water quality (e.g. soil cover, reduction of chemical use, ploughless soil tillage, creation/maintenance of buffer strips). Results from ESQ 3 showed that M10 had effects on water quality in 6 out of 10 case-study Member States (North Rhine-Westphalia (DE), Alsace (FR), AT, PL, RO, FI).

**Measure M11** supports organic farming. It has positive impacts on water quality by 1) promoting the reduction of inputs applied on lands (fertilisers, pesticides) and 2) promoting practices to preserve soil structure and organic matter in soil, with positive impact on reducing erosion, runoff and leaching. From ESQ 4 it appears that M11 had positive effects on water quality in the majority of the case-study Member States.

**Measure M12** aims at compensating disadvantages due to specific mandatory requirements resulting from the implementation of Natura 2000 and/or Water Framework Directive. This measure concerns a very limited number of beneficiaries, as it targets only farmers located in specific areas (ESQ1). Measure M12 had little uptake, with only 4 out of the 10 case-study Member States using it (North Rhine-Westphalia (DE), Aragon (ES) and Apulia (IT), AT). Among case-study Member States, M12 was mentioned to have had a significant positive effect on water protection in NRW-DE and Aragon-ES.

**Measure M16 and M19** concern collaborative actions, pilot projects and innovative practices. They can promote actions with positive impacts on water quality (e.g. collaborative innovative action to improve farm productivity with lower inputs use). According to the analysis conducted in ESQ3, few case-study Member States supported projects under M16 that directly target water issues. However, M16 was assessed to be effective on water issues in three case-study Member States (e.g. Aragon (ES), HR, NL). Likewise, no significant effect of M19 on water was assessed in most of the case-study Member states (no projects related to water management), apart from Romania, Austria and Finland.

### 5.7.3 EFFECTS OF INDIVIDUAL CAP INSTRUMENTS AND MEASURES ON WATERBODIES' QUANTITATIVE STATUS

The objective of the Water Framework Directive of good quantitative status concerns groundwater bodies. Results of ESQ 4 and 5 indicated that practices having a positive impact on the quantity of waterbodies are the ones that help:

- decrease water abstraction, and
- improve water retention in soil.

#### Horizontal measures

From the analysis in ESQ 1 and ESQs 3, 4 and 5, it can be concluded that cross-compliance is effective for objective of good quantitative status of waterbodies. The main instrument on quantitative issues is GAEC 2. It requires authorisation for abstraction with direct effects on water quantity. The effectiveness of GAEC 2 on water quantity was assessed in all case-study Member States (ESQ 3). Other cross-compliance instruments have indirect effects on water quantity. Practices helping to improve soil structure (e.g. vegetation cover) and to maintain organic matter in soil (e.g. limiting soil tillage) indirectly contributes to increasing water retention in soil (ESQ5). Within that context, GAECs 4, 5, 6 and 7 as well as SMR 1 can be beneficial to water quantitative status.

As mentioned in the previous section, the effectiveness of the Farm Advisory System (FAS) on water issues was assessed in 4 out of 10 case-study Member States (Aragon (ES), HR, NL and AT) and found to have positive effects on water quantity (ESQ3). Managing Authorities in Aragon (ES) mentioned that the FAS emphasised sustainable practices. Austrian interviewees mentioned that the FAS offered more



transparent information, raising farmers' awareness on water-related issues (including water quantitative issues).

## Pillar I

Under the **CMO regulation**, support can be granted to investments in irrigation under specific conditions. The effects on water quantity depend on the type of sector supported, the water issues in the area where the support is granted and the eligibility criteria established by the Member State. Notably, the provisions set out in Article 46 of Regulation (EU) No 1305/2013 for investments support under RDPs do not apply to sector-specific support. Among the case-study Member States, the CMO support to investments in irrigation were estimated to be effective in improving water use efficiency (ESQ3) in Alsace (FR), Apulia (IT), AT, RO and FI for the fruits and vegetable sector, and for the wine sector in Croatia and Austria. However, a lack of data on the investments supported by the specific sector support under the CMO prevents precise assessment of their effectiveness in this evaluation.

As for the **greening measures**, the crop diversification measure has the potential to impact water abstraction only when using less water-demanding crops. Following the assessment in ESQ 3, effects of the **crop diversification** on water quantity are either neutral (North Rhine-Westphalia (DE), Aragon (ES), HR, Apulia (IT), NL, AT, PL, RO and FI) or negative<sup>70</sup> (FR). **Permanent grasslands** improve water retention capacity of the soil by improving its structure. The effect of the permanent grassland measure on water quantity was assessed to be positive in all case-study Member States. **Ecological Focus Area** (EFA) has positive indirect effects overall on water quantity by improving soil retention of water and allowing decrease in water abstraction. EFA was assessed to be very effective on water quantity issues in Aragon (ES) and less effective in all other case-study Member States (see ESQ 3).

## Pillar II

Investment measure M4 under Pillar II supports i.a. investments for irrigation. Investments in precision irrigation and/or more efficient equipment for irrigation can have positive effects on reducing water abstraction (ESQ 5). However, outputs from ESQ 3 show poor effectiveness of M4 on quantitative water issues. This is due to the fact that actions under M4 were rarely allocated to Focus Area 5A (water quantitative management). However, case-study interviews and surveys documented that the modernisation of irrigation systems (under M4) has led to more efficient and sustainable use of water in Aragon (ES), Apulia (IT) and RO. Moreover, survey results reported an increasing trend in the investments for water collection and recycling (HR, NL, RO and FI), with positive impact on water quantity.

Many measures from Pillar II that have positive effects on water quality also have effects on water quantity (ESQ 3). Measures indirectly contributing to increase water retention in soil and/or decrease water abstraction, positively impact water quantity (e.g. M8 promoting afforestation; M10.1 promoting conservation tillage; M11 promoting soil organic matter conservation). Knowledge exchange and advisory activities (M1, M2) play a role in changes in practices affecting quantitative management of water (HR, NL, AT, RO). M10 was assessed to have a significant effect on water quantity; other Pillar II measures (M1, M2, M8, M11, M12) had a lower level of effectiveness on water quantity issues<sup>71</sup> (ESQ 3).

### 5.7.4 EFFECTS OF CAP INSTRUMENTS AND MEASURES ON WATERBODIES' ECOLOGICAL STATUS

The objective of the Water Framework Directive of good ecological status concerns surface waterbodies. A good ecological status results from good quantitative and good chemical status. All CAP instruments and measures mentioned to be effective as regard the objectives of good quantitative and good chemical status contributed to this objective, even if numerous SWBs failed to reach a good ecological status due to agricultural pressures.

Hydromorphology plays a role in the ecological status of the surface waterbodies. Hydromorphological pressures result from various anthropogenic activities (e.g. agriculture, industry, forestry). Water abstraction for irrigation can affect the hydromorphology of surface waterbodies (see introductory chapter). Thus, CAP instruments and measures having effects on water quantitative status have the

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<sup>70</sup> The maintenance of maize monocropping has to be balanced with the obligation to put a soil cover during winter.

<sup>71</sup> Mainly due to their limited level of implementation.

potential to influence hydromorphological status as well. The CAP instruments and measures with direct significant effects on hydromorphological status are the following:

### **Horizontal measures**

Within cross-compliance, GAEC 5 targets soil erosion and can have effects on the good hydromorphological status of waterbodies. In Finland, 'subsequent damages from livestock trampling' are checked under this GAEC; this helps to prevent erosion and morphological alteration along watercourses.

### **Pillar I**

No measure/instrument from Pillar I was identified as clearly having significant effects on hydromorphological status. However, permanent grassland could be used as floodplains, and some EFAs can contribute to bank stabilisation (e.g. buffer strips, hedges).

### **Pillar II**

Measure M4.4 can support investments with positive impacts on hydromorphology (e.g. investments in wetlands (FI), buffer zones, hedges (IT), restructuring of waterbodies (FR)). However, M4.4 was less taken up among case-study Member States (ESQ 3). **M8** also can support riparian forest plantations.

## **5.7.5 INFLUENCE OF EXTERNAL FACTORS**

External factors (e.g. domestic and industrial pollution and abstraction, climatic conditions, climate change, etc.) can also impact water's quantitative, qualitative and ecological status, as they influence the status of waterbodies and/or agricultural practices and agricultural pressures. External factors also influence the delay in response in the improvement of the water status (quality, quantity, ecological). There is a long latency period between the implementation of practices and the ensuing impact on water status. The length of this latency period is variable (e.g. a change in quantity and/or types of pesticides used will be observed 5 to 40 years later depending on the pedo-climatic conditions and treatment products used) (Dudley et al., 2012; Casado *et al.*, 2019)

The effectiveness of the CAP instruments and measures on the water objectives as presented in the conclusions may be tempered by the influence of these external factors.

## **5.7.6 REPLY TO ESQ 6**

ESQs 3, 4 and 5 showed that the CAP instruments and measures which contributed most directly to the objective of good chemical status of water are the cross-compliance instruments (mainly GAECs 1, 3 and SMRs 1 and 10), the greening measures and Pillar II measures M10 and M11. However, their level of contribution depends on the implementation choice of Member States/regions.

ESQ 3, 4 and 5 showed that the CAP instruments and measures which contributed most directly to the objective of good quantitative status of water are the cross-compliance instruments, most especially GAEC 2 and the greening measures on the conservation of permanent grasslands and EFAs. Regarding Pillar II, the main measures that appeared to be effective on water quantitative objectives are the agri-environment-climate measures M10 and particularly those improving soil structure. As in the case of water quality discussed above, the level of contribution of each of them depends largely on the implementation choice of Member States/regions.

In addition, even if not implemented in large areas over the last period, M8 on afforestation can have a significant positive effect on water quality and quantity, as these areas will be maintained as forests for decades, meaning that effects will be positive and cumulative in the very long term.

Other instruments/measures also had indirect effects on water, such as FAS, M1 and M2, by improving farmers' knowledge and awareness, and providing training on water issues. However, M1 and M2 were not frequently implemented or their uptake remained low, which hindered their positive contribution.

External factors (e.g. domestic and industrial pollution and abstraction, climatic conditions, etc.) can influence the status of river bodies and the effectiveness of the measures, in terms of both pressure and delay in response.



Agriculture as such remains one of the biggest pressures on water in the EU<sup>72</sup>, it can be concluded that the assessed CAP instruments and measures prevent from further additional degradation, rather than reverse the phenomenon.

## **5.8 EFFECTIVENESS - ESQ 7: TO WHAT EXTENT HAVE THE COMBINED CAP INSTRUMENTS AND MEASURES OVERALL CONTRIBUTED TO THE IMPROVEMENT/DETERIORATION OF PERFORMANCE OF FARMING PRACTICES IN RESPECT OF WATER IN ACHIEVING EU WATER-RELATED POLICY OBJECTIVES, IN PARTICULAR THE GOOD STATUS OF WATER BODIES?**

*The answer to this question should address in particular a) the direct payment support schemes, market measures and Farm Advisory Systems, and b) the Rural Development measures including investments in irrigation, and cross-compliance.*

### **5.8.1 UNDERSTANDING AND METHOD**

The objective of this question is to assess the combined impact of the overall CAP framework on water quantitative and qualitative status at the EU level, in particular on the good status of waterbodies.

Measures and instruments of the Pillar I, Pillar II and Horizontal regulation are considered here. First, the effects of the 'water-relevant CAP instruments and measures' on agricultural practices and related pressures on water analysed in ESQs 3-5 have been synthesised. Then, we address the role of farming practices and the corresponding effects on water by other CAP instruments and measures, i.e. potential effects of direct payments and M13 of the RDP.

The analysis of the potential effects of direct payments (DPs) considers the overall payments granted under Pillar I and focuses then on (i) the BPS/SAPS, which is the main instrument of DPs and consists in decoupled income support granted to farmers; and (ii) VCS, which also represents a significant part of the Pillar I budget, depending on the Member State, and directly supports specific sectors with potential effects on water. Other Pillar I instruments have not been specifically considered in the analysis because of the lower significance of their potential effects on water.

Analysis of the Pillar I contribution to farming practices is essentially based on FADN data, which make it possible to see the amount of support received by holdings according to their farm types.

### **5.8.2 SYNTHESIS OF THE EFFECTS OF CAP INSTRUMENTS AND MEASURES ADDRESSING THE SUSTAINABLE USE OF NATURAL RESSOURCES AND CLIMATE ACTION ON WATER STATUS**

The analyses conducted for ESQs 3, 4, 5 and 6 have demonstrated that the following measures had positive effects on the improvement of farming practices with regard to water, thus contributing to the EU status of waterbodies. The main findings have been synthesised in the table below.

**Table 61: Synthesis of the contribution of water-relevant measures to the good status of waterbodies**

		Chemical status	Quantitative status	Ecological status
Horizontal	GAEC 1 Buffer strips			
	GAEC 2 Authorisation for abstraction			
	GAEC 3 Groundwater protection			
	GAEC 4 Minimum soil cover			
	GAEC 5 Limiting soil erosion			
	GAEC 6 Soil organic matter			
	GAEC 7 Landscape features			
	SMR 1 Nitrates pollution			
	SMR 10 Phytosanitary products			
	Farm Advisory Service			

<sup>72</sup> Sources: European Commission, 2019, Report from the Commission to the European Parliament and the Council on the implementation of the Water Framework Directive (2000/60/EC) and the Floods Directive (2007/60/EC); Second River Basin Management Plans First Flood Risk Management Plans; and EEA, 2018, European waters - Assessment of status and pressures 2018.

		Chemical status	Quantitative status	Ecological status
P I	Crop diversification			
	Permanent grassland/ESPG			
	EFA			
	CMO specific sector support			
P II	M1 and M2 Knowledge/Advice			
	M4 Investments			
	M8 and M15 Forest			
	M10 AECM			
	M11 Organic farming			
	M12 WFD			
	M16 and M19 collaborative actions			

Source: Alliance Environnement

	Positive contribution to the water status in all case-study Member States
	Positive contribution depending on the implementation by the beneficiaries
	Positive or neutral effects depending on the implementation choices made at Member State level
	Neutral or negative effects on the water status in all case-study Member States

As analysed in ESQs 3, 4, 5 and 6, the CAP instruments and measures addressing the sustainable use of natural resources and climate action have effectively contributed to the protection/improvement of the chemical water status, considering that external factors such as climatic conditions, geology and topography may influence the effectiveness of the instruments/measures. The contribution of the water-relevant measures to improving the quantitative status and reducing the hydromorphological pressures from farming practices (affecting the good ecological status of surface waterbodies) is deemed as less effective. The analyses revealed that the theoretical positive effects of the measures are hindered by the implementation choices left to farmers or Member States.

The mandatory requirements under cross-compliance ensure that minimum beneficial practices to prevent the transfer of fertilisers, chemical pollutants and sediments by runoff and leakage are implemented by almost all beneficiaries benefiting from the CAP support. Cross-compliance also plays a positive role in the water-retention capacity of soil. The FAS can play a significant role by increasing farmers' awareness and knowledge on water-related issues, but its contribution depends on the way it is implemented. The options left to farmers by Member States under the greening measures hinder the additional effects of these measures on water quality. However, the introduction/maintenance of permanent grassland and EFA are positive for water retention.

Sector-specific support was used to aid efficient irrigation systems in many case-study Member States; however not all of them required specific water-savings from the equipment supported. Regarding the voluntary measures provided by the RDP, they can be implemented differently by Member State (e.g. M12, M8/M15, M1/M2), or their potential effect on water depends on the types of operation implemented by the farmers (M4, M10). M11 mostly contributed to the implementation of effective practices in terms of both water quantity and quality issues. M8 Afforestation has positive and cumulative effects on a very long term even though the area concerned was limited in the observed period, which is largely compensated by the fact that afforested areas will be maintained in forest for decades.

### 5.8.3 EFFECTS OF OTHER CAP INSTRUMENTS AND MEASURES ON THE IMPROVEMENT OF FARMING PRACTICES

#### 5.8.3.1 Effects of Pillar I on agricultural practices and related-pressures

The specific objectives of Pillar I are notably to contribute to farm income and limit farm income variability, to maintain a diverse agriculture, to provide public goods (mostly environmental) and pursue climate change mitigation and adaptation.

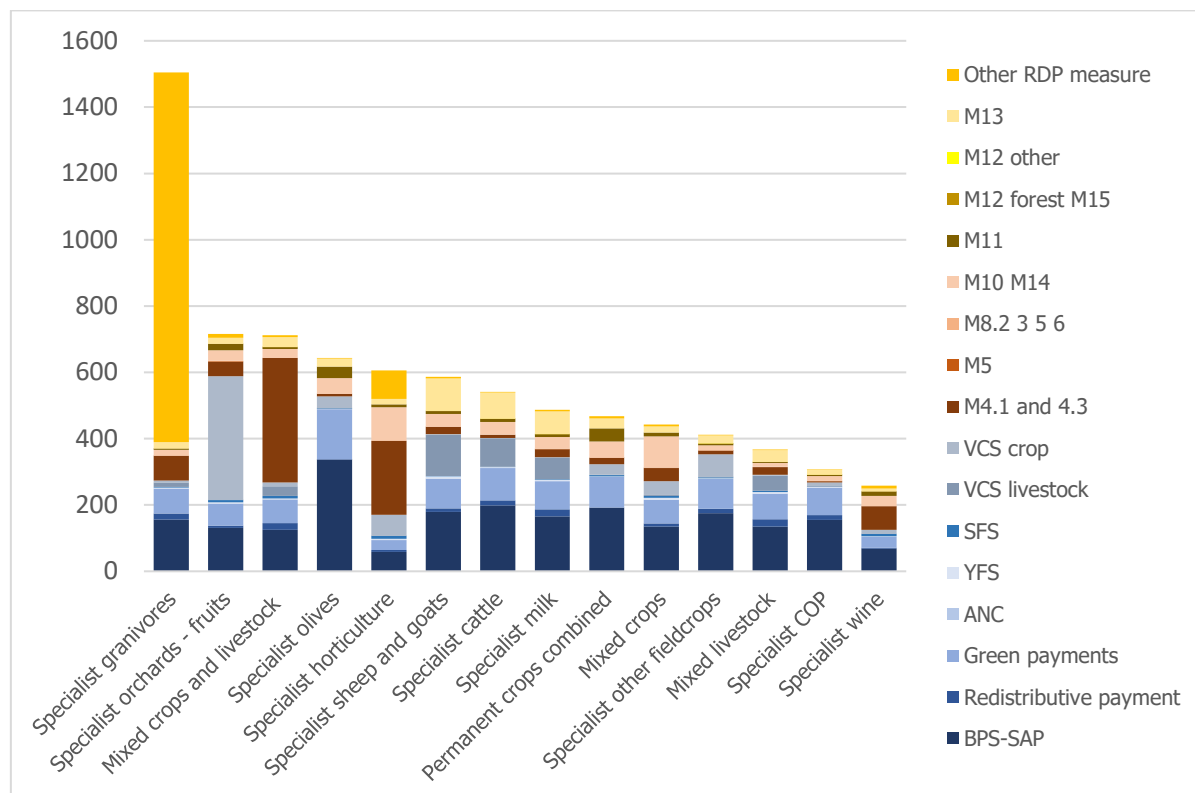
##### Role of cross-compliance

To receive the Pillar I support, farmers must respect the rules set by the GAECs and SMRs. Hence, Pillar I obliges farmers to comply with the minimum requirements set under the cross-compliance system that are positive for water.

## Direct payments as income support to efficient holdings

The EU provides farmers with income support or 'direct payments'. The hypothesis is that direct payments enable the maintenance of less profitable holdings with more extensive practices beneficial for the environment (e.g. highly diversified holdings, extensive grazing systems, etc.). For example, stakeholders interviewed in France highlighted that mixed-farms or extensive livestock grazing systems located in the northern regions had to switch to more intensive systems (e.g. maize cultivation) to remain profitable. They highlighted that CAP payments were, in that case, not sufficient to ensure minimum income to these livestock farmers that had to convert grasslands to cereals crops, with increased pressures on water quality and quantity.

**Figure 19: Average CAP payments granted to the different farm types at EU level (€/ha)**



Source: Alliance Environnement from FADN data

As shown in the above chart, the direct payments (in blue), in particular the BPS/SAPS, remain an important source of income at the EU level, notably for the farms specialised in olives (average BPS of €337/ha at the EU level), cattle breeding (€198/ha), permanent crops (€191/ha) and sheep and goat production (€179/ha). These sectors also often benefit from VCS.

The FADN analysis of Pillar I support on the added value of different farm types shows that most of the farm types generating more pressures on water quantity and quality (see ESQs 4 and 5), such as fruits and vineyard or horticulture, are on average less dependent on CAP supports than the farm types mentioned above. On the other hand, the relative importance of the direct payments in farm income are higher for Cereals Oilseeds and Protein plants (COP) growers who apply lower levels of fertilisers and pesticides per hectare. Within the livestock sectors, cattle-breeding farms or sheep and goat specialists have a relatively high share of their income coming from CAP support, notably Pillar I payments, when compared with pig and poultry specialists. Beef, sheep and goat producers are important for the maintenance of the permanent grassland areas, and the FADN analysis demonstrates that direct payments play a decisive role in their maintenance.

### BPS/SAPS as a 'decoupled' support

The Basic Payment Scheme/Single Area Payment Scheme are granted to farmers, independent of production, farm types or practices implemented, as long as they comply with cross-compliance. However, whereas the BPS/SAPS is decoupled from productions, it is an area-based payment, activated

on eligible land. In general, the total amount of basic payments received by farmers increases with the size of their holdings.

Few literature sources document the effects of BPS, and it is commonly agreed that large-scale holdings, which run more intensive production systems, affecting the environment more negatively than do other ones, are the main beneficiaries of the BPS/SAPS. A French thesis (Kirsch, 2017) revealed that the aid system, based on lump-sum payments granted by hectare or livestock unit, benefits the biggest farms<sup>73</sup>. However, whereas the study concludes that, in France, direct payments to farms had been more favourable to farms with potential adverse environmental effects on the environment from 2000 to 2013, this situation is not systematic across the EU. The analysis reveals that, in the UK, whereas the level of support granted per hectare is higher for holdings with less beneficial practices, holdings with environmentally-friendly practices actually get higher CAP support because of their larger areas. In Germany, the most environmentally-friendly holdings receive the higher average CAP payments per hectare. This could be explained by the choice of internal convergence of direct decoupled payments made by Germany in 2003, and carried out from 2005 to 2013.

### Basic payments rate distribution

Another hypothesis would be that unequal distribution of basic payments<sup>74</sup> could potentially benefit holdings with negative effects on water, e.g. higher BPS granted by hectare in areas of intensive farming.

The FADN analysis shows that the average payment rate for BPS ranges from less than €100/ha to more than €200/ha in river basins of the Member States studied. However, the analysis did not make it possible to establish a correlation between the basic payment rate and the agricultural sectors and/or related pressures on water. Depending on their location, farmers engaged in the same productions (e.g. livestock, arable crops) can receive support ranging from less than €100/ha (PL, RO) to more than €200/ha (IT, NL) independently of their practices or pressures on water. These differences also prevail within the international river basins of the Rhine (FR, NL, DE) and the Danube (AT, HR).

According to the evaluation of the CAP impact on viable food production (Agrosynergie - 2017), contributes to maintain farm holdings insofar as internal convergence has been effective in reducing the disparities in basic payment rate. More particularly, it results in a reduction of the highest level of direct payments per unit of land observed in the pre-reform period (notably in EL, ES, IT, PT and MT). This measure, together with the VCS or ANC, plays an important role in economic development in rural areas and contributes to maintaining ruminant holdings that are critical to maintain grasslands.

### Box 8: the CAP and the intensification of farming

A global assumption is that the CAP contributed, notably through the direct payments, to the intensification of farming with related negative impacts on water quality and quantity. However, the situation requires more qualification.

Analysis from Eurostat<sup>75</sup> on intensification/extensification did not make it possible to conclude on the influence of the CAP on the use of farm input. Since their accession to the EU, the trend among 'new' Member States (who joined the EU from 2004 onwards, e.g. Bulgaria, Estonia, Croatia, Latvia, Romania) has been fluctuant (intensification followed by extensification and intensification again). As for specific use of nitrogen and phosphate, neither the Eurostat analysis<sup>76</sup> nor the analysis carried out for this evaluation, made it possible to

<sup>73</sup> A. Kirsch's research compared the PI and PII supports granted to four categories of holdings of different farm types, according to their agricultural practices and potential impact on the environment, in France, the United Kingdom and Germany.

<sup>74</sup> BPS payment rate is affected by a series of choices made at Member State level (see ESQ1), among which:

- The application of BPS at national or regional level;
- The amount of historical entitlements received in the past, which can put at a disadvantage regions characterized by traditional crops historically not supported (e.g. vegetables, permanent crops, etc.);
- The theoretical application of uniform unit value (flat-rate) from 2015 or by 2019. Actually, to avoid harmful financial consequences for farmers, the process of internal convergence of payments can be activated, with farms receiving less than 90% of the regional or national average BPS amount benefiting from a gradual increase up to 2019, when no farmer should receive less than 60 % of the national/regional average value.

<sup>75</sup> [https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Agri-environmental\\_indicator\\_-\\_intensification\\_-\\_extensification](https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Agri-environmental_indicator_-_intensification_-_extensification)

<sup>76</sup> [https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Agri-environmental\\_indicator\\_-\\_mineral\\_fertiliser\\_consumption](https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Agri-environmental_indicator_-_mineral_fertiliser_consumption)

conclude on such a trend towards intensification in the 'new' Member States. Further, the quantity of fertilisers used remains far below the quantities used by the 'old' Member States.

A recent study on land-use policy (Rega, Helming and Paracchini, 2019) explained that the absence of the CAP, along with lower tariffs on imports, would have mitigated effects on water. In fact, it would lead to increased efficiency of nitrogen input used and a decrease of its impact on water quality (however, the analysis does not consider pesticide use). This scenario would favour large farm holdings and imports with potential negative effects on water quality. It would lead to the abandonment of small and medium farms with potential negative impact on the environment, and indirect effects on water. On the other hand, the European localism scenario appears to be the most promising to decrease the environmental pressure of agriculture. In this scenario the CAP is unchanged, but high tariffs on import are in place and the solutions to environmental problems are sought regionally/locally.

Another study on the CAP direct payments (Kirsch, 2017) qualified the assumption that holdings which mostly contribute to environmental objectives and the production of public goods are not the ones receiving the highest payment rates per hectare. In this study, the comparison between Germany, France and the United Kingdom showed that subsidiarity gives leeway to significantly modulating the redistribution of direct aid. Although holdings less favourable to the environment still receive more payments in France, this is not the case in Germany and in the United Kingdom, where the aid distribution is more favourable to environment-friendly holdings.

To conclude, it is not possible to state clearly that the CAP favoured the intensification of farming in the evaluation period.

Source: Alliance Environnement, based on literature review and Eurostat analysis

### **5.8.3.2 Effects of VCS on the maintenance/development of specific sectors and related pressures on water**

VCS can help to improve, at farm level, the profitability of the supported crop/livestock which would not be competitive compared to other alternative crops such as cereals (Alliance Environnement, 2017). The assumption here is that VCS targeting livestock and protein sectors can have positive effects on water resources by supporting the maintenance and/or the development of such sectors. It is considered in this evaluation that livestock rearing is beneficial when conducted under extensive grazing systems. Increase of protein crops areas is also beneficial for water since pulses are N-fixing crops that can reduce the need for N fertilisers spread on crops, with the associated risks of water contamination by runoff. Conversely, some VCS can also support some intensive holdings, with possible negative effects on water, but the sectors most supported by VCS remain extensive ruminant holdings.

#### **Effects of VCS on livestock sectors**

In 2016, average livestock density in the EU reached 0.8 livestock units per hectare of agricultural area, ranging from 0.2 in Bulgaria to 3.8 in the Netherlands<sup>77</sup>. Increase in the livestock density was reported in seventeen Member States among which some with high livestock density such as the Netherlands (+6.3 % since 2013) or Bulgaria with the lowest livestock density rate but the highest change in density (+11.1 % since 2013).

According to Regulation (EU) No 1307/2013, VCS is intended to maintain certain production activities facing difficulties and which are important for economic, social and/or environmental reasons. The regulation limits the use of this support above the historic levels of production<sup>78</sup>. Moreover, it must be noted that eligibility rules on livestock stocking density can be used by Member States to limit the number of animals for which each farmer may receive coupled support (e.g. eligible number of animals per farm, maximum stocking density). However, the analysis revealed that only a few of the case-study Member States have done so, i.e. only two of them offering coupled support to livestock have set limits on the number of eligible animals, thus preventing the densification of livestock sectors supported (e.g. FR and RO).

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<sup>77</sup> [https://ec.europa.eu/eurostat/statistics-explained/index.php/Agri-environmental\\_indicator\\_-\\_livestock\\_patterns](https://ec.europa.eu/eurostat/statistics-explained/index.php/Agri-environmental_indicator_-_livestock_patterns) consulted 18/11/19

<sup>78</sup> According to Article 52(6) of Regulation (EU) No 1307/2013, 'coupled support is a production-limited scheme (...) that shall respect financial ceilings to be determined by Member States and notified to the Commission.'

The level of support per farm is supposed to increase in line with the degree of intensiveness of livestock farm systems in other Member States. In these areas, the VCS can contribute to maintain high density and its corresponding pressures on water. The implementation of eligible criteria considering the pasture area available for each livestock unit could help decrease nutrient pressure on water. The FADN analysis shows that the VCS payments per livestock unit decreased for holdings with higher density<sup>79</sup>. However, in Finland and Croatia, holdings characterised by medium livestock density benefit from higher average VCS payments.

The analysis also examined whether the VCS granted to livestock sectors contributed to the maintenance of permanent grassland areas. It considered the change in livestock units and permanent grassland area in Member States having implemented or not the VCS. No specific effects of VCS for livestock on the maintenance of permanent grassland can be observed, as the trend is different in each Member State<sup>80</sup>. However, among the 12 Member States registering an increase (above 1%) of their permanent grassland area between 2015 and 2016, 10 have implemented the VCS to all three of the beef and veal, dairy, and sheep and goat sectors (PT, LV, LT, IT, HR, FR, FI, ES, CZ, BE).

It is important to recall that the change in livestock units over the 2015-2016 period was also influenced by a series of other economic and policy factors affecting the livestock sectors (e.g. market demand, abolition of milk quotas, etc.).

Hence, the main role of VCS on the grass-fed animal sector was mostly to support the maintenance of these holdings, with some positive effects on water.

### **Effects of VCS on protein crops**

In 2015, 16 Member States decided to grant support to several protein crops, including chickpea, soya bean, lupine, alfalfa, pea and fava bean. At the EU level, 10% of the executed budget was allocated to VCS for the protein sector in 2016.

In 2017, the evaluation of the greening payments of CAP Pillar I revealed that the VCS had been a driver in the increase of field pea, soya bean and lupine areas between 2015 and 2016. The level of support does not appear to be the main determinant of the change observed<sup>81</sup>. However, no specific effects were observed on broad and field beans, other forage legumes and fresh pulses (grown for human consumption) (Alliance Environnement, 2017).

Other economic factors contributed to the development of the protein crops over the 2015-2018 period, notably the increasing intra-EU demand for genetically modified (GM) free soybeans, oil and meals. Furthermore, the greening payments (EFA and crop diversification) also contributed to the increase of protein crops by supporting the introduction of N-fixing crops. Support to protein crops thus contributed to the maintenance/development of these crops that increase the flow of nitrogen and carbon into the soil, benefiting its carbon stocks, improving water retention capacity and reducing the need for additional N-fertiliser inputs. Positive effects on water quality and quantity are expected from an increase in areas dedicated to legumes/nitrogen-fixing crops. Hence, the effects of VCS on these productions were favourable, but concerned limited areas.

### **5.8.3.3 Effect of M13 payments to areas facing natural or other specific constraints (ANCs)**

The underlying assumption is that farms located in ANCs tend to favour practices more beneficial to water protection (e.g. permanent grasslands, diversification, crop-livestock farming systems, extensive management system, etc.) than holdings located in areas favourable to intensive farming systems, and

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<sup>79</sup> It must be noted that the analysis has been carried out for all holdings benefiting from livestock VCS together, whatever their production (beef, milk, sheep and goat).

<sup>80</sup> The evaluation study of the impact of the CAP measures towards the general objective of 'viable food production' carried out in 2018 reported that coupled support seems to influence farmers' decision to maintain their livestock units in a generally limited way: the positive effect seems limited to breeding (and production) of bovine animals for slaughtering. In the case of dairy cows, the observed variations of livestock and production are mainly due to the abolition of the quota system.

<sup>81</sup> I.e. higher rates of change were observed in Bulgaria (41.4%) with average amount of €152/ha, Slovenia (32.5%) with €412.3/ha, Italy (32.3%) with €37.4/ha, Lithuania (32.3%) with €145.7/ha and Croatia (29.8%) with €54.7/ha.



that M13 is necessary to compensate farmers for disadvantages to which the agricultural production is exposed<sup>82</sup>.

The recent evaluation of the impact of the CAP on climate change (Alliance Environnement, 2017) concludes that support provided by M13 is higher for extensive producers in most cases (M13 is favouring extensive systems in seven of the nine Member States studied in that evaluation).

This measure represents 36% of total public expenditure for Pillar II at EU level. Portugal and Poland are by far the Member States with the most holdings/beneficiaries supported. Austria, France and Poland have the largest total area under this measure, whereas France has by far the highest total public expenditure, at least twice larger than other Member States. This measure is mainly used under Priority 4: the analysis of the CMEF indicators on M13 Implementation revealed that 96.6% of the budget expenditures and that 78.9% of the beneficiaries supported were allocated to Priority 4 over the 2015-2017 period.

This measure was mentioned in the French and Romanian case studies as having a potential positive effect on water quality by influencing land occupation. In France, it was reported that the M13 objective was notably to maintain farming in ANCs, where grass-fed extensive cattle rearing has a positive impact on water quality but also quantity for the downstream areas by regulating water flows. In Romania, all three M13 sub-measures are targeted at Priority 4 with a specific focus upon Focus Areas 4A (restoring and preserving biodiversity) and 4C (preventing soil erosion and improving soil management). The main biophysical factor used for the identification of areas with natural constraints is drought (including soil-based limitations on water availability). It has been pointed out by the stakeholders interviewed that many areas eligible for M13.2 'Intensive/extensive cereal and mixed farming systems in the lowland plain areas' have irrigation systems installed or are eligible for investments under M4.3 (investments in rehabilitation of secondary irrigation systems). This situation led to exclusion of the concerned areas from M13 during the fine-tuning exercise, since the increased water availability from irrigation has effectively overcome the natural constraint. Although this was not demonstrated in this evaluation, it can be assumed that the combination of M13 and M4.3 led to increased water abstraction for irrigation in these areas.

The FADN analysis of the change in agricultural pressures between 2015 and 2016 did not highlight any difference in the percentage of irrigated UAA by farms receiving or not M13. However, it revealed that among COP specialists in Spain, where the difference is significant, the average fertiliser expenditure per hectare decreased more for farms benefiting from M13 than for farms not receiving M13 support. Among livestock breeders, those benefiting from M13 decreased their fertiliser expenditures less than did non-beneficiaries in France, Romania and Austria.

Pesticide expenditures seem to have decreased among the beneficiaries of M13 between 2015 and 2016, but increased among non-beneficiaries, in samples where the difference is deemed significant. Indeed, among COP specialists, pesticide expenditures decreased by 3.5% for beneficiaries in Spain (whereas they increased by 2.6% among non-beneficiaries). As for livestock specialists, the beneficiaries' expenditures decreased in Spain (-2.1% but increased by 6.5% among non-beneficiaries), in Italy (-2.3% but increased by 1% among non-beneficiaries) and Romania (-0.8% but increased by 1% among non-beneficiaries). However, given the many different trends between Member States/Regions and sectors, it is difficult to establish causality links between M13 and pesticides consumption.

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<sup>82</sup> It should however be noted that these payments are not linked with any management commitments and the respective farming systems, established due to the natural conditions, would not necessarily change, if ANC payments were not paid.



## 5.8.4 CONTRIBUTION OF THE COMBINED CAP INSTRUMENTS AND MEASURES TO THE IMPROVEMENT/DETERIORATION OF THE PERFORMANCE OF FARMING PRACTICES REGARDING WATER IN ACHIEVING THE GOOD STATUS OF WATERBODIES

### 5.8.4.1 Contribution of the combined CAP instruments and measures to the good status of waterbodies

The previous parts show that both water-relevant and other CAP instruments and measures can contribute to improve the performance of farming practices as regard water use and water protection. The table below makes a comparison of the main instruments targeting good water status. This does not mean good status is reached but shows which instruments contribute the most in improving status or in avoiding its degradation.

**Table 62: Synthesis of the contribution of the combined CAP instruments and measures to the good status of waterbodies**

	Chemical status	Quantitative status	Ecological status
<b>Cross-compliance</b>			
<b>BPS</b>			
<b>VCS</b>			
<b>Farm Advisory Service</b>			
<b>Greening measures</b>			
<b>CMO specific sector support</b>			
<b>RDP water relevant measures</b>			
<b>M13</b>			

Source: Alliance Environnement

	Positive contribution to the water status in all case-study Member States
	Positive contribution depending on the implementation by the beneficiaries
	Positive or neutral effects depending on the implementation choices made at MS level
	Neutral or negative effects on the water status in all case-study Member States

The diversity of implementation choices made by the Member States makes it difficult to assess the effective contribution of the combined CAP instruments and measures to water status improvement at EU level.

Apart from the cross-compliance scheme, whose mandatory requirements are set out in the regulation and effectively verified by the case-study Member States, other 'water-relevant' measures can be implemented in a diversity of ways, thereby influencing their real effects on water. It is considered here that their effects can be either positive or neutral. In-depth evaluation of the impact of each support scheme (e.g. greening, CMO, RDP, etc.) should be carried out to truly appraise how these measures were implemented and to what extent the operations supported were beneficial for water protection. However, the evaluation highlighted how the quantitative status of waterbodies is clearly affected by the potential risk from exemption of crop diversification for some monoculture (e.g. maize growers) and from investments in irrigation infrastructure under M4 (when water is abstracted from waterbodies whose status has been determined as less than good - Article 46 from Regulation (EU) No 1305/2013).

BPS/SAPS can have both positive and negative effects from a water perspective. Indeed, the absence of BPS/SAPS could lead to the abandonment of small diversified holdings mostly in grass-fed animal sectors and in ANC areas, or conversion of these farms to arable crops when possible, which would have negative effects on water (e.g. reduction of permanent grassland). On the other hand, BPS/SAPS are also supporting sectors that have more intensive practices, affecting negatively water quality and quantity. Indeed, the present area-based system is supporting holdings independently of their effects on the environment and related pressures on water, with cross-compliance being implemented to ensure that minimum mandatory practices are applied by the beneficiaries.

VCS and M13 have been assessed as relevant to maintain specific types of farming beneficial for water. However, their effects vary according to the implementation choices of Member States and sectors. It is important that Member States consider certain rules (e.g. to provide VCS for a limited number of livestock units or organic holdings) in order to avoid drawbacks on water.

#### 5.8.4.2 Changes in the number of waterbodies failing to achieve good status because of agricultural pressures

Data sets available on the WISE database do not enable assessment of how the situation evolved from 2010 to 2016 as regards the number of waterbodies which failed to achieve good status because of agricultural pressures. Indeed, there are many limitations hindering analysis:

- In many case-study river basins, no data were reported in 2010. This does not mean that no waterbodies were affected by water pressures. It is thus impossible to know if the changes in pressures coming from agriculture are positive or negative.
- Because the number of waterbodies considered in 2010 was significantly lower than in 2016, no comparison of absolute value is possible.
- When waterbodies failing to achieve good status have been affected by significant agricultural pressure, it is not possible to determine whether it was the agricultural pressure alone that actually caused the 'downgrading' of the waterbodies, or it was in combination with other significant pressures.

#### Chemical status of Surface Water Bodies

Among the case studies where data are available for 2010 and 2016 on the same pressure (e.g. Spain – diffuse agricultural pollution), no improvements have been observed for the chemical status of surface waterbodies<sup>83</sup>.

Among all the agricultural pressures reported as having an impact on the status of SWBs in 2016, diffuse pollution from agriculture is the one that most impacts the SWBs failing to achieve good chemical status<sup>84</sup>. There is an exception in Germany, where physical alteration from agriculture that most impacts SWBs. Except for the case-study RBDs of Austria, Poland, Romania and Finland, SWBs subject to significant agricultural pressures represents a significant proportion of all the SWBs that fail to achieve good chemical status. Hence, as a result, agricultural pressures seem to influence the deterioration of the chemical status of SWBs in almost all case-study RBDs, thus indicating that, even if changes can be long to appear, the effects of the studied instruments are not sufficient to reverse the situation.

#### Chemical status of Ground Water Bodies

The Danube RBD in Romania shows a small reduction of GWBs subject to significant diffuse agricultural pollution between 2010 and 2016 and that fail to achieve good chemical status. However, such a conclusion is not noticeable elsewhere. In 2016, diffuse pollution from agriculture seems to consequently impact GWBs of the case-study RBDs of Germany, Spain, France and Austria. For the case-study RBDs of Austria, the value of 100% GWBs subject to significant agricultural pollution is debatable, because only four GWBs have been monitored there. Almost all the GWBs not achieving good chemical status are subject to significant diffuse agricultural pollution. Here again, even if changes can be long to appear, the effects of the studied instruments are not sufficient to reverse the situation<sup>85</sup>.

#### Quantitative status of Ground Water Bodies

Only the case-study RBDs of Germany, Spain, Italy, Poland and Finland reported data on the number of GWBs failing to achieve good quantitative status. The share of GWBs failing to achieve good quantitative status and subject to significant agricultural abstraction is quite low in these Member States (between 0.1% to 12.9% of all the monitored GWBs). However, these GWBs represent the major proportion of GWBs failing to achieve good quantitative status (from 50% in FI to 100% in ES). It can be concluded that agricultural pressures cause the deterioration of quantitative status of GWBs in the case-study RBDs. As mentioned above, even if changes can be long to appear, the effects of the studied instruments are not sufficient presently to reverse the situation.

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<sup>83</sup> Following EEA 2019, comparing chemical status in the two RBMPs appears to be complicated because there was more pollutant monitored for the second RBMPs, and some Member States reported mercury as causing all of their surface water bodies to fail to achieve good chemical status. (Key findings p.36)

<sup>84</sup> The main pressures leading SWBs to failure to achieve good chemical status are atmospheric deposition and discharges from urban waste water treatment plants. EEA 2018 p.36.

<sup>85</sup> Even if EEA 2018, key findings p.36 it is mentioned that: during the first RBMP cycle, Member States made progress in tackling several other priority substances, such as metals and several pesticides, suggesting that some effective measures were implemented.

## Ecological status of Surface Water Bodies

No improvements occurred between 2010 and 2016 in the case-study RBDs that reported SWBs affected by significant agricultural pressures.

In 2016, diffuse agricultural pollution was the pressure impacting the highest number of SWBs with poor or bad ecological status in the case-study RBDs, compared to the four other agricultural pressures reported (abstraction, physical alterations, hydrological alteration and creation of dams for irrigation). An exception prevails for the North Rhine-Westphalia RBD in Germany, where physical alteration from agriculture impacts even more SWBs of poor and bad ecological status. This pressure also affects a significant number of SWBs not enjoying good ecological status in Croatia too. Besides, the case-study RBDs of Germany, France, Croatia and the Netherlands show the highest share of SWBs of poor and bad ecological status subject to agricultural pressures, as compared to all the monitored SWBs in these Member States. In addition, surface waterbodies subject to significant agricultural pressure account for more than half of SWBs with poor and bad ecological status in the case-study RBDs, except in Austria, Poland and Romania. Hence, agricultural pressures play a significant role in the deterioration of the ecological status of SWBs in almost all case-study RBDs. As in the case of the other statuses mentioned above, even if changes can be long to appear, the effects of the studied instruments are not sufficient presently to reverse the situation.

### 5.8.5 REPLY TO THE ESQ 7

Following the assessment, it is not straight forward to draw conclusions on the effective contribution of the combined CAP instruments and measures to the improvement of the performance of farming practices to support achieving a good status of waterbodies. There are various reasons for this.

Firstly, the WISE data do not enable assessment of whether the number of waterbodies failing to achieve good status because of agricultural pressures evolved between the first RBMP (2010) and the second RBMP (2016). However, the analysis of the waterbodies failing to achieve good status in the RBs studied revealed that a significant proportion is subject to significant agricultural pressures, notably diffuse pollution, abstraction and, to a lesser extent, physical alterations from agriculture.

Secondly, the evaluation underlines the varying effects of the CAP instruments and measures according to Member States, depending on their implementation choices (budget allocation, eligibility criteria), the measures' level of uptake and the way the beneficiaries chose to implement them. Hence, apart from cross-compliance, which requires mandatory minimum practices from farmers set by the regulation (and implementation standards set by Member States), the other CAP instruments and measures leave room for manoeuvre to the Member States as regard the measures' design and settings (see ESQ 1). Subsequently, the effects of the CAP water-relevant measures depend largely on the level of requirement set by Member States and the willingness of farmers to implement effective practices under the voluntary measures available in the RDP or the greening measures.

The FAS can play a significant role by increasing farmers' awareness and knowledge on water-related issues, but its contribution depends on the way it is implemented. As shown in ESQ 3, little information is available on the type of advice provided through the FAS. According to interviewees, the FAS has been reported as an important source of information on water in Croatia, Aragon (Spain) and Austria, but is still a challenge in some Member States/regions.

Then, sector-specific support under CMO was used to aid efficient irrigation systems in many case-study Member States; however, not all of them required specific water-savings from the equipment supported. According to the case studies, eligible criteria were determined in some Member States in the fruit and vegetable sector and in the wine sector, to ensure that installation and/or improvement of any system supported allows for better management of water resources. However, the effects are very diverse when known, and so it is very difficult to assess their effectiveness in this evaluation (see ESQ 3).

The effects of other CAP instruments and measures are difficult to assess. With regard to BPS/SAPS, it is considered here as both positive and negative from a water perspective, since the absence of BPS/SAPS could lead to the abandonment of small diversified holdings mostly in grass-fed animal sectors and in ANC areas, or conversion of these farms to arable crops when possible, which would have negative effects on water (e.g. reduction of permanent grassland). On the other hand, basic payments are also supporting sectors that have more intensive practices, affecting negatively water quality and quantity. Moreover, the present area-based system is supporting more large holdings, independently of

their effects on the environment and related pressures on water, with cross-compliance being implemented to ensure that minimum mandatory practices are applied by the beneficiaries.

VCS and Rural Development measure M13 have been assessed as potentially relevant to maintain some specific types of farming beneficial for water. However, their effects vary according to the implementation choices of Member States. VCS can lead to higher density of livestock units and increase the corresponding pressure on water contamination by nitrates. It is important that Member States set eligibility criteria to avoid drawbacks on water (e.g. maximum threshold of livestock units supported, minimum grassland area or maximum livestock density to be eligible).

In a few cases, drawbacks on water were reported by the stakeholders interviewed, e.g. in the case of investment support granted under M4 that supports irrigation extension affecting waterbodies whose status has been determined as less than good in quantitative terms, without really considering that effective savings are achieved.

Finally, in terms of waterbodies failing to achieve good status because of agricultural pressures, it is clear from the analysis that, even if changes can be long to appear, the effects of the studied instruments are not sufficient presently to reverse the situation.

## **5.9 EFFECTIVENESS – ESQ 8: TO WHAT EXTENT HAVE TECHNOLOGICAL AND SOCIAL INNOVATIONS IN THE AGRICULTURAL SECTOR CONTRIBUTED POSITIVELY OR NEGATIVELY TO ACHIEVING THE CAP OBJECTIVES ON SUSTAINABLE MANAGEMENT OF NATURAL RESOURCES AND CLIMATE CHANGE RELATED TO WATER?**

### **5.9.1 UNDERSTANDING OF THE QUESTION AND METHODOLOGICAL APPROACH**

In the EU, as well as in the rest of the world, innovations are identified as a major lever for enhancing sustainable water management. The G20 agricultural ministers, in their 2017 action plan, highlighted the importance of innovations to improve the management of water resources (G20 Agricultural Ministers, 2017). In the EU, innovation is one of the seven flagship priorities of the Europe 2020 strategy for a smart, sustainable and inclusive economy. In agriculture, innovation is a cross-cutting objective of the CAP, and a specific objective of its second pillar. Water resources management is in particular identified as a key challenge in the EU strategic approach to agricultural research and innovation published in 2016 (European Commission, 2016a).

The term innovation refers to 'the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organisational method in business practices, workplace organisation or external relations'<sup>86</sup>. This ESQ focuses on both technological innovations, which include a wide range of new products and technologies, and social innovations<sup>87</sup>, which refer to process and organisational patterns. Social innovations are also defined as innovations that are 'social both as to their ends and their means, and in particular those which relate to the development and implementation of new ideas and thereby benefiting society and boosting its capacity to act'<sup>88</sup>.

The methodological approach relied on both quantitative and qualitative data. It has been based on the identification of the relevant technological and social innovations and the description of their positive (and negative) effects on water management, the assessment of their level of adoption among farmers and other relevant stakeholders (based on a review of relevant literature and quantified through a survey carried out in case-study Member States) and the identification of the factors favouring or limiting the emergence and dissemination of social and technological innovations on EU farms (based on recent literature, interviews with relevant stakeholders and the above-mentioned survey).

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<sup>86</sup> European Commission - MEMO/10/473 06/10/2010, available at [http://europa.eu/rapid/press-release\\_MEMO-10-473\\_fr.htm](http://europa.eu/rapid/press-release_MEMO-10-473_fr.htm).

<sup>87</sup> Technical innovations (innovative practices) are not in the scope of this ESQ. They are analysed in the other effectiveness ESQs.

<sup>88</sup> Article 2 of Regulation (EU) No 1296/2013 of the European Parliament and of the Council amending Decision No 283/2010/EU.

### 5.9.2 POTENTIAL EFFECTS OF TECHNOLOGICAL AND SOCIAL INNOVATIONS ON WATER MANAGEMENT IN AGRICULTURE

There is a large diversity of innovations used across the EU that may affect water management in the agricultural sector. Based on the literature and interviews in case-study Member States, the main relevant technological and social innovations have been identified (see table below)<sup>89</sup>. **Technological innovations** belong to different categories: biological technologies, genetic improvements, technologies based on information and communication technologies (ICT), mechanical innovations, water-treatment technologies. **Social innovations** mainly concern knowledge sharing organisation, resources sharing and management, financial tools, breeding practices, land conservation and management and labelling. The following table provides a summary of the potential effects on water of the identified innovations.

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<sup>89</sup> It should be noted that some practices considered as innovative in one Member State can be quite common practice in others.

**Table 63: Technological and social innovations related to sustainable water management and their potential effects on water**

Type	Innovation	Potential effects on water:	
		quality	quantity
Technological innovations			
Biological technology	Technologies for nutrient recovery in animal manure	+	0
	Feed additives to improve feed efficiency and reduce N and P excretions	+	0
	Nitrification inhibitors in soil	+	0
Genetic improvement	Crop selection: drought-resistant crops, pest-resistant crops and adapted agrophenology	+	+
	Increased ruminant feed efficiency (with selection or biotechnologies).	+	0
ICT-based technologies	Mobile app to recognise pest and diseases on field	+	0
	Irrigation, fertilisation and/or pest and diseases management assisted with digital technologies (precision farming)	+	+
	Information systems to provide timely information to steer farmers' management of irrigation, pest and diseases control and/or fertilisation	+	+
	Smart water meters (to measure water consumption and provide specific advice to farmers)	0	+
	Information systems to provide farmers timely information on flood risks	0	+
Mechanical innovation	High-efficiency irrigation systems (e.g. micro-irrigation technologies, drip irrigation, sub-surface drip irrigation)	0	+
	High-efficiency delivery mechanisms for fertilisers	+	0
	Optimised soil management equipment (e.g. direct seeding or shallow tillage equipment)	+	+
	Smart greenhouse (self-regulating and micro-climate-controlled environment for optimal plant growth)	+	+
Water treatment	Reuse of treated wastewater	+/-	+
	Desalination of water for irrigation or other agricultural use	0	+
Social innovations			
Knowledge sharing	Online forum or platforms on management practices	+	+
Resources sharing and management	Groups of farmers or mixed stakeholders (e.g. farmers, advisers, citizens, policymaker, etc.) working on local challenges linked to water quality	+	0
	Groups of farmers or mix stakeholders (e.g. farmers, advisers, citizens, policymaker, etc.) working on water management and sharing	0	+
	Groups of farmers sharing equipment furthering sustainable management of water and/or soil	+	+
Financial Tools	Financing of sustainable management of the water resource through crowdfunding and sponsorship	+	+
Breeding	Organisations conserving, exchanging or selling seeds of ancient and local varieties (e.g. community seed banks)	+	+
	Participatory plant breeding of crops	+	+
Land conservation and management	Organisations which purchase land of particular interest for the management of the water resource in order to conserve it	+	+
	Land and Water Stewardship involving landowners, civil society and users in the conservation of nature and landscape, often with the support of a voluntary contract	+	+
Labelling	Label or private brands promoting sustainable water management.	+	+

**Legend:** positive effects (+); negative effects (-); mixed effects (+/-); no effect (0)

Source: Alliance Environnement compilation based on literature review

The effects of innovations may vary according to the farming system, the biogeographical region and the socioeconomic context in which they are implemented, and the way they are implemented. For instance, for the implementation of collaborative approaches, strong leadership and facilitation often play a key role (Pahl-Wostl *et al.*, 2007). The effects of innovations (especially social innovations) are



also strongly influenced by the governance structure and cultural context in which group processes are embedded. Rigid hierarchical and bureaucratic structures may lead to a status quo and provide barriers to social learning (Pahl-Wostl *et al.*, 2007). Furthermore, the use of many digital innovations requires an access and capacity to use information and communication technologies (ICT) such as the internet and mobile apps, etc. The technical skills and management practices of farmers are also of great importance. Water-use efficiency depends on better agricultural practices in addition to the corresponding technology. Improperly managed innovative systems can be wasteful (or even in some cases harmful) and show no improvement compared to poorly managed traditional systems (Levidow *et al.*, 2014). The following box presents the risks of negative effects associated with technological innovations that could hinder the achievement of the CAP objectives on sustainable management of natural resources and climate change adaptation related to water.

### Box 9: Risks related to the technological innovations identified

**Risks of 'rebound effects':** the overall environmental benefits arising from a technological development might remain below potential, e.g. if efficiency savings are counterbalanced or eliminated by increased production and consumption (Perry and Karajeh, 2017). For instance, decrease in water consumed per irrigated hectare may lead to a larger irrigated area; the use of heavy equipment on soils can lead to soil compaction and reduce its water-retention capacity; the reuse of wastewater can lead to the release of pathogens and pollutants in soils and rivers (by leaching) if badly managed.

**Risks linked to farmers' behaviour and their knowledge of technologies:** e.g. excessive use of fertiliser and pollution of water courses due to the misuse of high-efficiency manure delivery equipment.

**Risks related to biotechnologies:** New Breeding Techniques<sup>90</sup> (NBT) have gained considerable importance in the crop selection sector over the past few years. Yet, they entail various potential use-related risks which are still under analysis, e.g. the development of resistance in pests targeted by the genetically modified crops, gene flow to wild relatives which can create resistance in non-target organisms or potential negative effects on soils when the improved resistance makes it possible for farmers to grow crops in monocropping systems (Bartsch *et al.*, 2009).

**Risks of knowledge and know-how erosion:** Decision support systems and smart technologies may lead to a gradual loss of experience and knowledge in farms. Hochman and Carberry draw attention to the fact that 'the innovations should aim to educate farmers' intuition rather than replace it with optimised recommendations' (Hochman and Carberry, 2011).

In some cases, combinations of technological and social innovations can lead to synergies and to greater benefits than each innovation used alone. For instance, participatory modelling for water management allows stakeholders to combine modelling technologies, local knowledge and experiences to achieve realistic projection. The model can then be used as a decision-support tool to allocate abstraction rights in the most efficient and adapted way (Pahl-Wostl *et al.*, 2007).

## 5.9.3 LEVEL OF ADOPTION OF TECHNOLOGICAL AND SOCIAL INNOVATIONS

The impact of innovations on water pressures depends on the level of adoption by farmers and relevant stakeholders. So far, few surveys have been performed at EU level to evaluate the uptake of innovations in agriculture (Soto *et al.*, 2017; European Commission, 2018; Barnes *et al.*, 2019; Alliance Environnement, 2018). For instance, for precision farming, some data collection has been performed in the EU, but the results are mostly region-specific (European Commission, 2018). Therefore, a survey was performed to collect estimates from farm advisers on the uptake of the main innovations identified in the 10 case-study Member States.

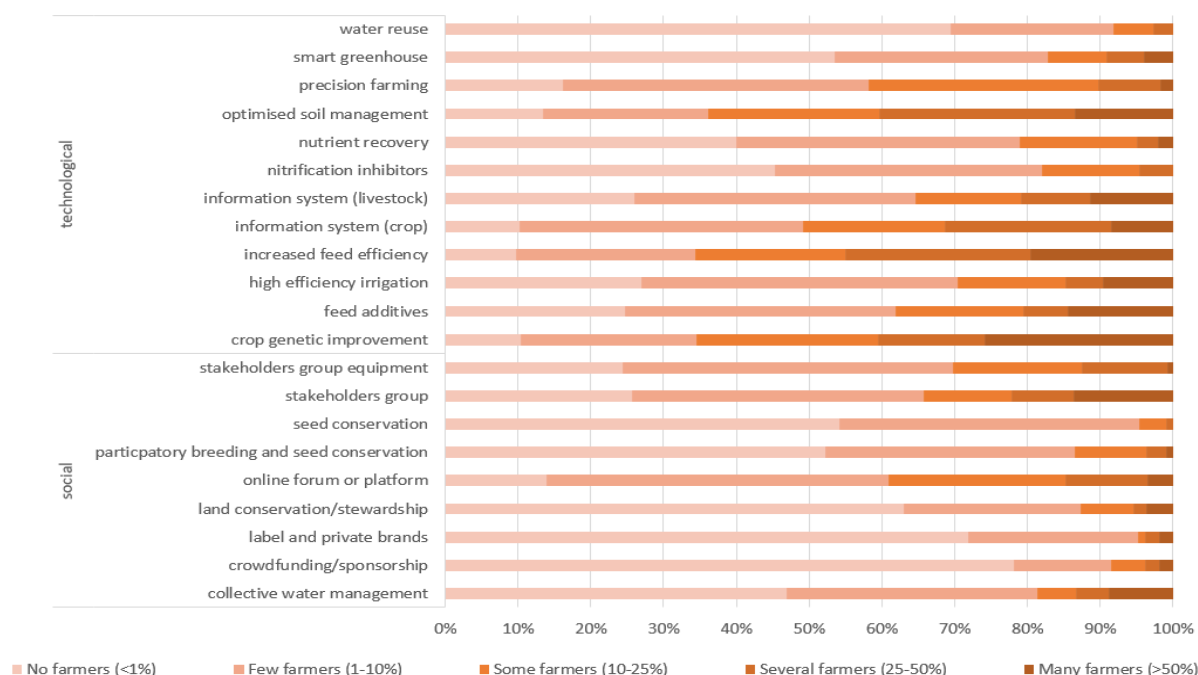
Its results (see Figure 20) show that the most widespread innovations are mainly technological innovations, namely optimised soil management equipment (e.g. direct seeding or shallow tillage equipment), genetic improvements for crops (drought-resistant crops, pest-resistant crops and adapted agrophénology) and livestock (increased feed efficiency), and, to a lesser extent, the organisation of groups of farmers or mix stakeholders working together on local challenges, and the use of information systems to steer crop or livestock management. On the other hand, the innovations showing the lowest adoption rate are the financing of sustainable management of the water resource through crowdfunding

<sup>90</sup> NBT are using genetic engineering (e.g. cisgenesis and intragenesis or epigenetic modification) to develop new traits within a given species.



and sponsorship, the implementation of specific label or private brands promoting sustainable water management, and the reuse of wastewater.

**Figure 20: Estimated adoption rate (% of farmers) in the case-study Member States**



Source: Opinions of 120 farm advisers in DE, ES, FR, HR, IT, NL, AT, PL, RO and FI – case-study survey

The level of adoption can vary widely depending on the geographical location/climate, cropping systems, technical developments, social issues, diversity in field sizes, and farm scale and diversity of farm and production-chain structures (see section 5.9.4). As for **technological innovations**, in arable farming, precision farming is more widespread on larger farms in central and northern Europe than in the rest of Europe (EIP-AGRI, 2015). The results of the survey show that while the use of optimised soil management equipment (e.g. direct seeding or shallow tillage equipment) is quite widespread in some western and central Member States (most of the respondents in DE, ES, IT, AT and NL considered that more than 25% of farmers use this equipment), it is still an emerging innovation in HR and PL (most of the respondents consider that less than 10% of farmers are using this type of equipment). The use of high-efficiency irrigation systems is more developed in Mediterranean Member States (ES and IT)<sup>91</sup>, given their long-held tradition in irrigation management and their development of more efficient systems with research centres, technology transfer initiatives, advisory services, etc.

The development of **social innovations** is also different across the EU. In Croatia, most respondents estimated that less than 1% of farmers are using the social innovations under study, except for the use of online platforms and forums to share knowledge and experiences (for which the adoption rate is estimated at 1% to 10%). In the other case-study Member States, the adoption rate of social innovations is higher, but it remains on average lower than technological innovations. The most widespread social innovations vary across the Member States: collective management of the water resource in Spain, groups of farmers or mixed stakeholders working on local challenges in DE, FR, NL and AT and groups of farmers sharing equipment in IT, RO and FI. It should be noted that the participation in water management groups can be compulsory for irrigating farms in some areas (e.g. in some areas in France and Romania) (Alliance Environnement, 2018).

<sup>91</sup> In Italy, all respondents but one estimated that more than 25% of Italian farmers use such technologies. In Spain, 40% of the respondents estimated that more than 50% of farmers use high-efficiency irrigation systems.

#### 5.9.4 MAIN FACTORS FAVOURING OR LIMITING THE EMERGENCE AND DISSEMINATION OF SOCIAL AND TECHNOLOGICAL INNOVATIONS ON EU FARMS

Despite the benefits that can be provided by many innovations in the field of water management, their uptake remains low in many Member States (Rose *et al.*, 2016). The factors favouring or limiting the emergence and dissemination of innovations have been widely studied in recent years (EIP-AGRI, 2015; Rose *et al.*, 2016; Hochman and Carberry, 2011; Levidow *et al.*, 2014; Barnes *et al.*, 2019). They can impact the providers of innovations (i.e. the development of innovations) or the users (i.e. the dissemination of innovations).

Among these drivers, **policy instruments and legal provisions** – and especially the CAP – can play a key role. The main measures that may impact the development and the dissemination of innovations are the **RDP measures** linked to Rural Development Priority 1, 'Knowledge transfer and innovation in agriculture, forestry and rural areas,' which covers the measures M1 ('Knowledge transfer'), M2 ('Advisory services') and M16 ('Cooperation'), as well as the horizontal measure Farm Advisory Services. These measures may support specific capacity building and cooperation actions on (technological or social) innovations<sup>92</sup>. Investment measures (M4) can also support dissemination of innovations (e.g. by facilitating the investment in technological innovations) (European Commission, 2017). The Agri-environment-climate measures (M10 AECM) may also support the set-up of land and water stewardship contracts (Sabaté *et al.*, 2013). Innovation is also a key objective of the LEADER approach (measure M19). Innovations may also be supported under CMO measures, but no examples of innovation measures directly linked to water management have been identified. The **EU directives** (ND, WFD and the Directive for Sustainable Use of Pesticides), by constraining farmers to adopt or stop some practices, can also foster or hinder the emergence and dissemination of innovations. For instance, in Belgium, the Nitrates Directive has been a major driver for some farmers to invest in nutrient recovery technologies. The Flemish action plan includes an obligation to process manure in such a way that the nitrogen is not released on Flemish agricultural soil after treatment but is, rather, exported, used on non-agricultural land (e.g. in gardens or parks) or converted to nitrogen gas or to a mineral fertiliser (Loosvelt *et al.*, 2015). Within the framework of the WFD, public participation is considered as a key element, and collective approaches for the management of the water resource are promoted.

The **EU research and innovation programmes** have also been significant drivers to the development and diffusion of innovations linked to water resource management (EC, 2017a). Especially, various projects linked to sustainable water management are supported under the H2020 programme<sup>93</sup>. Many other EU policies or institutions that address innovation and skills development can also contribute to agricultural research and innovation on sustainable management of water resources (e.g. LIFE+, Cohesion Policy, the European Investment Bank and the European Fund for strategic Investments) (EC, 2017a). Furthermore, the European system Copernicus provides data for monitoring the agricultural practices, including practices related to water management.

However, policy instruments and legal provisions can sometimes hinder innovations (e.g. when the adoption of an innovation is limited by regulatory constraints). In order to identify such constraints, the European Commission introduced in 2017 the concept of Innovation Deals, which is defined as 'a pilot approach to help innovators facing regulatory obstacles (e.g. ambiguous legal provisions), by setting up agreements with stakeholders and public authorities' (EC, 2017b). It is worth noting that the first Innovation Deal signed concerns water reuse (see the box below).

##### Box 10: Regulatory constraints linked to wastewater reuse in EU

In several EU Member States<sup>94</sup> (mainly Mediterranean MS), there is a growing interest in using non-conventional water sources as an additional supply, especially the reuse of treated wastewater as an alternative to

<sup>92</sup> Measure 16 ('Cooperation') supports the setting-up and the actions of European Innovation Partnership (EIP) operational groups.

<sup>93</sup> Horizon2020 is the biggest EU research and innovation programme aiming to couple research and innovation in all sectors, including agriculture and forestry, as a mean to achieve smart, sustainable and inclusive growth and jobs. One example of project favouring sustainable water is HyPump project which aims at sustainable irrigation through hydro-powered pumps for canals.

<sup>94</sup> In the 2015 communication 'Closing the loop – An EU action plan for the Circular Economy' (COM/2015/614) and in the Inception Impact Assessment of the EU, water reuse initiative at hand, agricultural irrigation and aquifer recharge were identified as main potential sources of demand for reclaimed water.

groundwater use for irrigation purposes. Various sources agree to say that, at present, the uptake of water reuse solutions remains limited in comparison with their largely untapped potential (Levidow *et al.*, 2014; EC, 2017b; Alcalde-Sanz and Gawlik, 2017). Indeed, wastewater reuse faces several barriers: a lack of clarity in the regulatory framework to manage risks associated with water reuse<sup>95</sup> and too stringent quality criteria set by national legislations (Levidow *et al.*, 2014; BIO by Deloitte, ICF and Cranfield University, 2015).

Consequently, the European Commission proposed in May 2018 a new regulation to stimulate and facilitate water reuse in the EU for agricultural irrigation (COM (2018) 337). This regulation, recently adopted by European Parliament, includes the definition of minimum quality standards for the use of treated water for irrigation and requires reclamation plant operators to draw up risk management plans. It also includes transparency and traceability requirements to encourage public confidence in water reuse.

Furthermore, according to case-study interviews, the fact that the investments have to be made before the support is provided can also be barrier to the implementation of innovation. The absence of advance payment can be quite hindering for farmers who have to invest first and sometimes wait for quite a long period of time before receiving the support. In the Netherlands, various stakeholders mentioned the restriction on the use of manure to produce chemical fertilisers as a barrier for innovation. Indeed, manure surpluses could be used in an industrial process to produce chemical input that could be used to complement the use of 'raw' manure as an input on crops. This industrial process is forbidden in the EU.

**Other drivers** include progress in research, extension and education, fiscal policies, other national policies which support innovative actions and processes, as well as other social drivers. According to interviews in Croatia and Poland, social innovations based on collective approaches would be associated in many farmers' minds with negative historical implications (in relation to the communist period), which hinders their development. However, the interviews in Poland also pointed out that the support provided mostly within CAP convinced farmers in some branches to organise themselves into groups.

**Farm size and their capacity to invest** were also mentioned as a key factor in the case-study interviews (see section 5.9.3). Technological innovation can imply various costs for farmers (or other stakeholders). These costs can be both direct (price of the technology) and indirect (e.g. due to system adaptation needed in order to use the innovation). According to interviews in Austria, technological innovations such as precision farming represent considerable investments for small holdings (average farm size in Austria is around 20 hectares). In Poland, it was also reported that only economically strong holdings can afford to invest in technological innovations, thereby limiting their uptake. Administrative burden linked to RDP measures may also deter farmers from applying for investment measures to invest in technological innovations (see ESQs 9 and 10).

### 5.9.5 REPLY TO THE ESQ 8

The data and information available did not allow for measuring the real effects of innovations related to water. Nonetheless, the findings of the analysis do confirm that technological and social innovations have contributed to an improvement of water management in the EU (e.g. with the improvement of the efficiency of irrigation equipment in the southern EU).

The review of the literature showed the diversity of technological and social innovations implemented across the EU that may affect water management in the agricultural sector, with the potential to contribute to the achievement of CAP objectives for sustainable management of natural resources and climate change related to water. In particular, precision farming and optimised soil management machinery (used in conservation agriculture) have developed in the recent years, especially in central and western EU, and allow farmers to use resources in a more efficient way (i.e. fertilisers, plant protection products, water).

As demonstrated by the literature, the effects of these innovations on water vary depending on the farming system, the biogeographical region and the socioeconomic context where and how they are implemented. Indeed, improperly managed innovative systems can be wasteful (or even in some cases harmful) and show no improvement compared to poorly managed traditional systems. The effects of innovations (especially social innovations) are also strongly influenced by the governance structure and cultural context in which group processes are embedded. In this respect, for the innovations to be

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<sup>95</sup> In 2015, six Member States had national water reuse standards (Cyprus, Greece, Spain, France, Italy and Portugal).

effective in improving water management, farmers' knowledge and awareness must be raised to avoid the misuse of innovations and the rebound effects on water quality and/or quantity. Effective advisory services, knowledge exchange and demonstration projects can help to avoid these negative effects.

According to the survey carried out in the case-study Member States, the adoption rate of social innovations is on average lower than for technological innovations. The adoption rate of innovations varies across the EU, e.g. the use of optimised soil management equipment is more developed in western and central EU and high-efficiency irrigation systems are more common in Mediterranean Member States, etc. The case studies revealed that in ex-communist Member States (e.g. HR and PL), social innovations based on collective approaches are associated in many farmers' mind with negative historical implications, thereby hindering their development. Furthermore, some innovations which could meet the CAP specific objectives linked to improved water management are still not very developed, e.g. the reuse of treated wastewater<sup>96</sup>.

## **5.10 EFFICIENCY – ESQs 9 AND 10: TO WHAT EXTENT HAVE THE CAP INSTRUMENTS AND MEASURES AS IMPLEMENTED BY THE MEMBER STATES GENERATED THE BEST POSSIBLE RESULTS TOWARDS THE OBJECTIVE OF SUSTAINABLE MANAGEMENT OF NATURAL RESOURCES AND CLIMATE ACTION WITH ITS AVAILABLE BUDGET?**

***A. To what extent are the administrative burden and administrative costs, also created through monitoring and reporting mechanisms, proportionate to the given support and the results achieved?***

***B. To what extent is there scope for efficiency gains, simplification and burden reduction?***

***C. To what extent did simplification occur in the evaluation period?***

The methods developed to analyse the efficiency of water quality objectives on the one hand (ESQ 9) and of water quantity objectives on the other (ESQ 10) are similar. Moreover, as seen in ESQ 6, most of the CAP instruments and measures have an impact on both water quality and quantity. Therefore, the analysis on the answer to the two ESQs is presented in a single chapter. The analysis does, however, specify when some conclusions are relevant for either water quality or water quantity only.

### **5.10.1 UNDERSTANDING AND METHODOLOGICAL APPROACH OF THE EVALUATION QUESTION**

Efficiency is defined as the best relationship between employed resources and results achieved in pursuing a given objective through an intervention (cost-effectiveness analysis). Whether or not there has been efficiency depends both on the EU CAP regulations and on the way it has been implemented at Member States or Managing Authority level. The outputs of the effectiveness analysis (ESQs 3-8) indicate the results achieved in pursuing the environmental objectives of the instruments/measures under investigation. Regarding the resources employed, a number of different costs have been considered depending on the type of instrument:

- **Direct costs** of the policy, i.e. the payments made to beneficiaries.
- **Opportunity costs** incurred by beneficiaries: these are the direct costs resulting from carrying out the supported activities (e.g. loss of revenue) or investments.
- **Transaction costs** incurred by beneficiaries. These represent the indirect cost of the measure or instrument (e.g. planning the adoption of new practices, preparing the application, etc.).
- **Potential deadweight effects**: these are the beneficial effects that would have arisen even if the policy had not been implemented. It is thus necessary to examine how measures have been targeted to beneficiaries who really need such incentives to change or maintain their practices.
- **Administrative costs**: these occur throughout the various stages of the policy cycle including the preparatory stages of setting objectives, gathering data and designing the measure, implementation, monitoring and evaluation.

Finally, additional objectives of the 2013 CAP reform were simplification, improved targeting and more uniform payments, which all aim at improving CAP efficiency. The ESQs thus looked at the change in

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<sup>96</sup> A new regulation to stimulate and facilitate water reuse in the EU for agricultural irrigation (COM (2018) 337) has been recently adopted by the European Parliament.

the level of administrative burden, both between the two programming periods (before and after 2014) and within the current programming period.

Regarding the analysis of efficiency, it has been performed only on measures and instruments whose objective is to address the sustainable management of natural resources and climate action (i.e. instruments/measures with indirect impact, e.g. BPS/SAPS, VCS, M13, were excluded). Moreover, ESQs 3-8 demonstrated that most of the measures and instruments aiming at this objective can to some extent affect both water quality and quantitative management through their impact on land use and management practices. Only GAEC 2 and Article 46 of Regulation (EU) No 1305/2013 specifically focus on water quantitative management.

Since the results of ESQs 3-8 are mostly qualitative, it was not possible to carry out a direct cost-effectiveness analysis. Hence, the analysis of Pillar II measures focuses mostly on output indicators. As for identification of direct costs dedicated to water, since Pillar II data on expenditures are not disaggregated per type of operation and since most of the measures are dedicated to various objectives, the analysis focused only on the budget allocation related to water-relevant focus areas. The budget and outputs related to both water quality and quantity are thus analysed using the data targeting Priority 4 and Focus Areas 5D and 5E. The efficiency of RDP measures addressing water quantity issues was assessed using budget and output data targeting Focus Area 5A.

Opportunity and transaction costs have also been examined to analyse the extent to which they are covered by the direct cost of the measures (i.e. the payment made to the beneficiaries), mainly based on results from case-study interviews. The design of the measures can also entail defining eligibility and selection criteria that can help in targeting support to increase their efficiency. The use and success of such targeting is assessed based on interviews in case studies and literature reviews. This section is supplemented by an analysis of potential deadweight effects. As for the assessment of administrative costs, considering the difficulty in collecting homogeneous and comparable data on costs across Member States, the analysis is based on literature analysis and qualitative statements collected directly from stakeholders through interviews.

The assessment of policy efficiency finally considers whether or not changes have led to reducing the administrative burden at the beneficiary, Member State and EU levels. This part is based on the interviews and results from previous studies.

## **5.10.2 DIRECT COSTS OF THE CAP INSTRUMENTS AND MEASURES COMPARED TO THEIR RESULTS IN TERMS OF WATER QUALITY AND QUANTITATIVE MANAGEMENT IMPROVEMENT**

### **5.10.2.1 Comparison of the direct cost and the results of greening measures and cross-compliance**

The evaluation study highlighted the potential of the greening measures to constrain a majority of farms to comply with environmental and climate obligations, using the threat of their losing some of their basic payments. Coupled with the Integrated Administration and Control System (IACS), the measures act as an incentive that helps prevent non-compliance by farmers and that protects and to some extent enhances beneficial practices. Still, the effect of the measures is limited by the low level of constraint in the diversification measure, the broad choice of eligible EFAs, and the fact that the ratio of permanent grasslands continued to decrease over the period studied. It can be considered that greening payments did not incur additional direct cost, since they are a share part of direct payments that is now subject to compliance with greening requirements. To that respect, the efficiency of those measures could be seen as high. The same can be concluded for cross-compliance that is not associated with any direct cost. However, when considering that the direct cost of the greening measures is actually 30% of the direct payments, then the related efficiency is less favourable.

### **5.10.2.2 Comparison of the direct cost and the results of RDP measures**

The table below compares the scope and direct costs of each measure, by presenting the level of adoption and the average level of support of each relevant RD measure. It is based on CMEF data.



**Table 64: Synthesis of direct costs for RDP measures (2015-2017)**

Measure and instruments	Number of MS concerned	Mean level of support (euros/[unit])	Min level of support (euros/[unit])	Max level of support (euros/[unit])
<b>Measures affecting water quality (allocated to P4-FA5D-FA5E)</b>				
Measures contributing to raise farmers' awareness and knowledge				
<b>M1</b>	15	318 /beneficiary	17	27,463
<b>M2</b>	12	224 /beneficiary	48	1,204
Measures contributing to prevent pollutants transfer				
<b>M4.1</b>	17	7,824 /operation	1,285	245,546
<b>M4.4</b>	14	7,561 /operation	3,899	671,517
<b>M10.1</b>	28	105 /ha	58	1,754
<b>M11</b>	26	196 /ha	31	561
<b>M12</b>	14	71 /ha	27	176
Measures influencing land use				
<b>M8.1-8.2</b>	12	2,452 /ha	556	50,637
<b>M8.4</b>	13	964 /ha	379	5,932
<b>M15.1</b>	10	136 /ha	42	3,458
<b>Measures affecting water quantity (allocated to FA5A)</b>				
Measures contributing to raising farmers' awareness and knowledge				
<b>M1</b>	4	180 /beneficiary	23	10,958
<b>M2</b>	3	466 /beneficiary	92	1154
Support to investments improving the management of water quantity				
<b>M4.1</b>	5	18,110 /operation	4,684	89,129
<b>M4.3</b>	8	267,077 /operation	129,175	1,421,425

Source: CMEF output indicators 2014-2020, updated 01/2019

### Analysis of the level of support per unit (hectare, operation, beneficiary)

The analysis of the CMEF output indicators of water-relevant measures shows that area-based measures influencing land use (M8 and M15) were implemented by fewer Member States but are more remunerative for farmers than measures contributing to prevent pollutant transfer (M10, M11 and M12). It also shows that, on average for M4.1, operations supported under FA 5A linked to water quantity are more costly than operations supported under P4 and FAs 5E and 5D linked to water quality, although fewer operations are supported and in fewer Member States.

These trends hide significant heterogeneity regarding the average level of support between measures and Member States. For instance, for water quality, for measures M4.1, M4.4, M10.1, Member States which monitored a large number of operations generally have the lowest unit costs. However, for M11, this not the case. Hence, the level of adoption of M11 seems to be linked with the amount of support provided per hectare. On water quantity, Member States supporting the highest numbers of operations under M4.1, M4.3 and M15.1 are also the most remunerative. This confirmed the findings of the 'Evaluation of the forest measures under Rural Development Programmes' (Alliance Environnement and EFI, 2017), outlining that the amount of support by hectare is a significant driver for the uptake of forest contracts aiming at preserving water resources. Finally, collaborative operations under M1 and M2 (such as implemented in Spain, Croatia and Austria) tend to support more farmers at a lower cost per participant than do individual operations under the same measures.

### Analysis of the measures' outcomes as compared to their unit costs

ESQ 3 shows that M8, M10 and M11 were the most effective RDP measures to protect water quantity and quality. Considering the average payment granted to the beneficiaries as regard their outcomes in terms of changing or maintaining their practices, their efficiency is considered as significant in terms of protecting water. Measures related to farmer advice (M1 and M2) could also reach significant effects with relatively low direct costs. However, their uptake remained low over the period considered. Conversely, although the average direct cost of M4 is quite significant per operation, its effect both on water quality and quantity is very difficult to assess, because of a lack of data on water-relevant operations supported.



### **5.10.3 DESIGNING AND TARGETING OF CAP INSTRUMENTS AND MEASURES ADDRESSING WATER QUALITY AND QUANTITY ISSUES**

#### **5.10.3.1 Integration of opportunity and transaction costs within payment rates**

##### **Pillar I supports**

##### Greening measures

The evaluation study on the payment for agricultural practices beneficial for the climate and the environment (Alliance Environnement and Thünen-Institut, 2017) assessed that costs for farmers to comply with greening measures were negligible for all but farmers of highly specialised arable farms. For those farmers, the crop diversification measure has entailed significant costs. In particular, the requirement to maintain ESPG, which was expected to affect the economic profitability of farms, was found not to have significant economic impact, given the fact that the ESPG areas are often areas that are unlikely to be replaced by arable land. The opportunity cost of implementing the EFA measure was also found to be limited, due to the fact that farmers mostly choose to use productive EFAs such as catch crops and nitrogen-fixing crops. However, the ban on pesticide use on EFAs is expected to increase the opportunity cost of the measure, especially for farmers producing nitrogen-fixing crops as EFAs.

##### Cross-compliance

SMR 1 on manure-management facilities is associated with significant opportunity cost. But the cost of implementing cross-compliance should not be supported, except during the first year of implementation according to Article 17(6) of Regulation (EU) No 1305/2013. Indeed, according to this article, support can be granted to farmers for investments contributing to adaptation to new EU requirements for one year following the date on which they become mandatory for the agricultural holding. In Aragon (ES) and Croatia, investment measures have been used to facilitate compliance with requirements related to manure storage facilities (SMR 1) or to support investment in machinery limiting soil erosion (GAEC 5). In Finland, M10.1.3 offered support for cooperation between livestock and crop farms regarding nutrient use encouraging compliance with SMR 1. In Alsace (FR), M4 was used to facilitate the increase of manure stoking areas, as 80% of areas were declared as NVZs, leading to rules for manure management that were constraining.

Except for SMR 1, other water-related cross-compliance rules were rarely pointed out during interviews because of their opportunity cost. Nevertheless, there are some cases in Member States where some restrictions have had significant opportunity costs. GAEC 1 has sometimes been pointed out as being associated with significant opportunity cost, as it might imply a reduction in productive areas. Under GAEC 6, Hungary and Romania place restrictions on which crops may be grown in successive years, and Czechia requires incorporation of manure in soils or the use of N-fixing plants. In the Netherlands, the obligation under SMR 1 to maintain groundcover after the cultivation of maize on sandy soils (starting in 2019) is also expected to lead to significant opportunity cost, as farmers might have to acquire appropriate machinery or pay for the service.

##### **RDP measures contributing to raising farmers' awareness and knowledge or promoting collaborative actions (M1, M2 and M16)**

The activities under M1, M2 and M16 are in most cases paid on invoice, and no specific issue on the rate of support was mentioned in the case studies. Nevertheless, the case-study of the Netherlands indicated that payment under M1 does not include the fees for project coordination. According to the stakeholders met, the lump sum for hours spent on advisory activities falls within the actual working cost in the Netherlands. This situation caused private advisory services to stop drawing up and applying for such projects, leaving only public organisations to draw up and manage them.

##### **Area-based RDP measures (M10.1, M11, M8.1 and M15.1)**

The payment rates for M10.1, M11, M8.1 and M15.1 should be equal to the compensation for the income forgone and the incurred costs, and be calculated based on national statistics, in general in cooperation with public research.

In three out of the ten case studies (Austria, North Rhine-Westphalia (DE) and Alsace (FR)), the stakeholders mentioned that the support provided on water-related AECMs was too low to cover the actual cost of implementation of the practices, in particular in areas of intensive farming. In these same

case-study areas, RDP payment rates were established at RDP level; thus, when taking into account the diversity of farms and different management practices, these payments seem to be below the actual cost of opportunity in areas with intensive production.

The case studies of Croatia, Apulia (IT), the Netherlands and Poland showed that in these areas the stakeholders agreed that the rate of support for water-related AECM properly compensates the opportunity costs. The 'Evaluation study of the forestry measures' (Alliance Environnement and EFI, 2017) under Rural Development showed that payments rates for M15.1 and M8.1 also properly covered opportunity costs. In Finland, according to the interviewees, the rate is even high on some measures (e.g. buffer strips). In three case studies (Finland, Croatia and Apulia (IT)), it was reported that payment rate for water-related Rural Development measures do take transaction costs into account. It was specified that, in Croatia, only transaction costs for activities directly linked to the supported commitments (such as information collection, knowledge acquisition, registration fees, permits, etc.) are considered. In the Netherlands, the management of the AECM measures through farmer collectives allows for a significant reduction in transaction costs for farmers.

Furthermore, the stakeholders interviewed in Alsace (FR), the Netherlands and Austria regret the lack of incentive component in AECM payments. Though this situation is related to WTO rules, the managing authorities would like to have the possibility to grant higher payment rates for the AECM so that they are more attractive to farmers. This was also mentioned in the evaluation of the forest-related measures (Alliance Environnement and EFI, 2017) about M15.1 and M8.1.

Regarding M11, the FADN analysis (see table below) showed that, in some Member States, the revenue of organic farms is higher than for non-organic farms (e.g. in France, Croatia, Italy, the Netherlands and Romania). However, it seems that the environmental advantages of this farming system are considered as sufficient to induce most Member States to continue financing their maintenance.

**Table 65: National average FNVA per AWU before CAP payments for organic and non-organic farms (average 2012-2016)**

Member State	Non-organic farms (€)	Organic farms (€)	Average difference in €/AWU
AT	7,164	5,037	-2,127
DE	22,454	12,647	-9,807
ES	15,394	13,637	-1,757
FR	12,620	13,270	651
FI	-43,177	-45,278	-2,101
HR	1,665	2,186	520
IT	14,835	19,968	5,132
NL	40,515	47,501	6,986
PL	2,641	-195	-2,835
RO	3,071	4,864	1,793

Source: Alliance Environnement from FADN 2012-2016

### Support to investments (M4)

While the support rate for non-productive investments (M4.4) can be up to 100%, the support rate of the productive investments carried out under M4.1 – as set in Annex II of Regulation (EU) No 1305/2013 – is limited to 50% in the less developed regions, 75% in Croatia and 40%<sup>97</sup> in the other regions. Such partial compensation is explained by the fact that most of these investments are beneficial for farmers and would have been performed anyway. However, this kind of support can encourage and speed up the decision to invest, according to interviews in Spain and France.

Nevertheless, during the Netherlands and Poland case studies, farmer representatives mentioned that water-quality-related investments in most cases do not improve the productivity of the farm, and should thus be supported at a higher rate, as in the case of non-productive investments. In Alsace (FR), the managing authority also stated similar situations. On irrigation-related investments, the case studies

<sup>97</sup> The support rate can be increased up to 60% for young farmers, collective investments, areas facing natural constraint, operations supported in the framework of IEEP, or investments related to Article 28 (AECM) or Article 29 (Organic farming) of the regulation.

showed that the support for investments is generally very appreciated by farmers, even if the support rate set in Annex II of that Regulation involves a significant share of self-financing.

### **5.10.3.2 Appropriateness of the targeting of the water-relevant CAP instruments**

Targeting is a key tool for improving efficiency of water-relevant CAP measures. Indeed, narrowly targeted measures enable the spending of funds where they are most needed or most efficient. Conversely, broadly targeted measures incorporate a greater diversity of possible actions to protect water on various territories but with reduced efficiency. Targeting is mostly implemented through the use of eligibility and selection criteria under Pillar II measures. But some targeting can also be observed within cross-compliance standards.

On water quality, in the Alsace region (FR), the Water Agency has decided to focus its co-financing under AECMs on water catchment areas and set stringent eligibility criteria for farmers to access the measures. In this way, potential effects are maximised (especially on water potability) with as little possible money spent.

Under cross-compliance, Czechia has set more restrictive rules in areas judged to be at risk of erosion under GAEC 5. Germany also focuses some of its cross-compliance rules on areas at risk from water erosion. In Member States where SMR 1 requirements apply only to Nitrate Vulnerable Zones (as opposed to Member States having classified their whole territory as Nitrates Vulnerable Zones), the administrative burden associated with the establishment and identification of NVZs both at administration and farmer levels was said to be significant. Considering that cross-compliance is not associated with direct cost, such targeting seems not always relevant in terms of efficiency gain.

On water quantitative management, for M4.1 and M4.3, the targeting is ensured by Article 46 of Regulation (EU) No 1305/2013 which sets eligibility rules for support to investments in irrigation systems and infrastructures. However, as shown in ESQ 3 to 8, these rules are not very restrictive, as they allow farmers to increase their irrigated areas, even where the status of water bodies is 'less than good'. Conditions set by Article 46 of that Regulation for irrigation investment measures include the reduction of the total amount of water withdrawn at farm level (even in the event of increased irrigated area); however, according to interviewees, it is not enough. According to Spanish environmental stakeholders, modernisation of irrigation often led to the introduction of new crops that are more water-demanding, increasing total requirements for water consumption.

### **5.10.3.3 Deadweight effect and long-term efficiency of the measures**

In order to prevent a deadweight effect, it might be preferable to focus the support on beneficial actions that are not very widespread or attractive, or on beneficial practices that are on the decline. Especially, when the level of requirement is set close to the practices already used by most of the farms or when a measure supports investment in equipment that is already quite widespread among farmers, deadweight effect can be significant. Such cases were mentioned in Finland, France and Spain. In Finland, for example, the AECMs on plant cover in winter and the reduction in the use of manure on fields have been identified as actions which would have certainly taken place even without the CAP. In France, some AECM schemes for livestock producers were mainly designed to compensate for the loss of other payments (e.g. the PHAE 'Prime herbagère agro-environnementale' scheme) with requirements deliberately set close to the practice already in use, according to the evaluation of the impact of the CAP on climate change (Alliance Environnement, 2017a).

It should be noted that, in certain circumstances, support can be deliberately granted to farmers so that they maintain their unusual or declining beneficial practices. To guarantee the absence of deadweight effect, support might have to focus on practices that are poorly remunerative. However, even in the absence of deadweight effect, long-term efficiency of a given support is not always guaranteed. Indeed, in the event of change in practice that is associated with significant opportunity costs, the support is often necessary to maintain these practices. Once support stops, the farm often goes back to its previous practices. Some cases of such steps backward after the ending of an AECM were mentioned during some case studies (e.g. in Alsace (FR)).

#### **5.10.4 ADMINISTRATIVE COSTS OF THE CAP INSTRUMENTS AND MEASURES COMPARED TO THEIR RESULTS IN TERMS OF WATER QUALITY AND QUANTITY IMPROVEMENT**

The recent study 'Analysis of administrative burden arising from the CAP' (Ecorys, 2018) concluded on the 'limited availability and inconsistency of data on administrative costs related to CAP implementation'. Besides, the previous evaluation studies of the CAP implemented since 2016 outlined the difficulty for Managing Authorities to make a breakdown of the indirect costs related to each measure of the RDPs, as the programmes are managed as a set by the managing teams. The analysis is thus based on literature analysis and qualitative statements collected directly from stakeholders through interviews.

##### **5.10.4.1 Overview at the CAP level**

According to the analysis of administrative burden arising from the CAP (Ecorys, 2018), IACS-based CAP instruments (those which require an assessment of eligible area: 94% of EAGF and 53% of EAFRD) and measures generate an annual administrative cost of €1.7 to €1.9 billion, representing 3.0% to 3.3% of the CAP budget. Greening, cross-compliance and area-based RDP measures (especially AECMs) were identified as having particularly high administrative costs, at €166 million to €186 million, €130 million to €152 million, and €558 million to €million.

Furthermore, according to this study, for farmers, the share of administrative burden, excluding compliance costs, accounts for about 2% of the total aid received.

##### **5.10.4.2 CAP instruments and measures mainly influencing land use affecting water in terms of quality and quantity**

###### **Greening measures**

The evaluation of the CAP greening measures (Alliance Environnement and Thünen-Institut, 2017) estimated in 2017 that for most of the Member States the one-off implementation costs of the greening measures fall between €0.24 and €0.69 per hectare, with running costs of between €0.12 and €0.60 per hectare. They arise mainly from on-farm checks and the obligation to map landscape features into the Land Parcel Information System (LPIS). The implementation cost is thus quite high and was perceived as quite high by interviewees. Greening measures help in preserving or developing existing key beneficial practices such as landscape features, cover crops, fallows and permanent grasslands (influencing water both in terms of quality and quantity) and the development of nitrogen-fixing crops limiting the use of fertiliser. As noted in the 2017 above-mentioned evaluation, Member States have in most cases offered a wide range of EFA options to their farmers, in order to facilitate compliance costs.

However, the pattern of uptake by farmers – with very high proportions of catch crops, fallow and N-fixing crops being declared – means that administrative burden has been incurred to map other EFA features, while bringing few benefits. Still, having all these features mapped will help monitor their change. The Commission and farmers also incur administrative costs, with costs to farmers estimated at €86 million to €217 million per year for additional time to process information and carry out administrative tasks. The estimated additional annual administration costs (averaging both implementation and running costs over five years) associated with the greening measures account for 3.0% to 8.5% of the total public administration costs associated with the management of direct payments at EU level. Various simplifications of the greening measures have been set up during the programming period (see section 5.10.5.2).

###### **Cross-compliance**

According to the analysis of administrative burden arising from the CAP (Ecorys, 2018), estimated costs for cross-compliance range between €130 million to €152 million for public authorities (€0.72/ha to €0.85/ha of UAA). Indeed, all farms must be administratively verified, and on-farm verifications require implementation of complex selection processes in addition to an on-farm visit. In the event that non-compliance is detected, farmers can appeal, but this can also lead to considerable administrative burden. It does, however, provide significant possibilities to farmers. It should nonetheless be noted that animal identification under SMRs represents a large share of the estimated costs of cross-compliance, compared to other SMRs and GAECs related to water management.

On the farmer side, administrative cost of cross-compliance is mainly linked to farmers' need to keep themselves up to date with the latest developments in the regulation and to be available for verifications. The complexity of some standards was also mentioned as a source of administrative burden for farmers (e.g. in the Alsace (FR) case-study).

It was outlined in ESQ 6 that cross-compliance measures, particularly GAECs 1, 3, 4 and 5, SMRs 1 and 10 as well as GAEC 2 (focused on water quantity objectives) were among the most effective measures regarding water quality and quantity objectives. Thus, administrative burden generated by water-related cross-compliance measures appears to be appropriately proportionate to their results in terms of water quality and quantity management. However, it can be noted that the multiplication of regulations and tools to protect the same practices or features (e.g. under GAEC, AECM and greening measures) is a considerable source of administrative burden to farmers, but also of confusion among the farmer population according to interviews and the literature (Court of Auditors, 2014).

#### **5.10.4.3 CAP instruments and measures mainly influencing crop, plot and livestock management practices affecting water in terms of quality and quantity**

##### **M10 AECM**

The analysis of administrative burden arising from the CAP (Ecorys, 2018) concluded that AECM had relatively high implementation and control costs compared to other IACS-based RD measures (more than 60% of personnel costs by IACS-based RD measures in some Member States studied), mainly due to the complexity of some types of operation and changing eligibility requirements. They can involve assessment of many eligibility and selection criteria. As seen in the section above, targeting supports can be a way to increase their efficiency, but a trade-off should be found so as not to lead to disproportionate administrative burden. Items to be checked for verifications can also be numerous and can differ according to the type of commitments, and require specific field investigation (checks on late mowing, fertiliser/phytosanitary inventory books and storage premises, etc.).

In the Netherlands, the collective approach facilitated the management of M10; there was a high administrative cost, but the measure reached a large number of beneficiaries and hectares, with limited administrative burden on farmer side. In France however, the breaking down of the CAP support into numerous types of operation, associated with the revision of the instrumentation and verification systems, led to considerable delays in the delivery of support for AECM. Still, while determining at the national level the list of potential AECMs to be used by Managing Authorities at regional level might have led to administrative burden optimisation, it is associated with a decrease in effectiveness because they have been considered as less adapted to local conditions (e.g. Alsace (FR)).

Despite the wide diversity of implementation choices of M10.1 across Member States, this compulsory measure was assessed to be a significant driver for encouraging the adoption of practices beneficial to water quality and quantity, especially to promote systemic changes. Thus, administrative burden associated with this measure appears appropriate overall, to ensure adequate control and targeting. The collective approach in the Netherlands could however be widespread when possible in an attempt to improve the effectiveness/administrative burden ratio.

##### **M11 Organic farming**

M11 is considered a well-established and long-running measure in most of the Member States, with little administrative burden associated. No specific information was found in the case studies or in the literature.

##### **M8 Investments in forest area development and M15 Forest-environment and climate services and forest conservation**

According to the evaluation of the forest measures (Alliance Environnement and EFI, 2017), the forest measures (M8, M15) have not been taken up in a number of Member States (e.g. in Ireland, Finland or some federal states in Germany) due to the requirements in the regulation (e.g. forest management plan, selection criteria, control and reporting requirements) and replaced by national aid. The EC strengthened the requirements for transparency and traceability between the two programming periods. According to this evaluation, it seems that the additional workload was mostly transferred by Member States to beneficiaries. The administrative burden is especially high for smallholders with low financial and/or technical capacities. But given the effectiveness of the measures to protect water in the long term (especially in the case of M8), it can be considered that this administrative cost is quite



proportionate with the effects of the measures. In the 'Evaluation study of the RD forest measures' (Alliance Environnement and EFI, 2017) a collective approach, aiming at gathering small forest holders to facilitate their access to support for the restoration of damage to forest (M8.4) was found in Aquitaine (FR). This approach reduced the administrative burden both for the administration and for beneficiaries and resulted in a large-scale implementation of this measure.

## **M4 Investments**

The effects of M4 on water quality are more variable and depend on the type of operation supported. As for M10, the introduction of new selection and eligibility criteria under M4 was mentioned as a source of administrative burden in some Member States, especially as regards investment in irrigation (cf. next section). The new investment measure which is focused on non-productive investments was also mentioned as particularly difficult to establish and implement in Poland and Alsace (FR). The efficiency of this measure is especially limited in Alsace, where no application was received by the Managing Authorities after the first call for tender. In Poland, it was mentioned that this new environmentally focused investment measure (M4.4) brought more complicated application procedures and forms when compared to previous RDP core work, which concerned purely technological issues (investments in machinery, etc.). The efficiency of the measure as regards water protection is thus limited. However, targeting some of the support initially planned for productive investments in more environmentally friendly practices is important given the share of Pillar II support dedicated to this measure, and such targeting can justify the associated administrative burden.

### **5.10.4.4 CAP instruments and measures supporting irrigation**

As seen above, the introduction of new selection and eligibility criteria under M4 was mentioned as a source of administrative burden in some Member States. Implementation of Article 46 in particular generated considerable administrative burden in some Member States. According to case studies, this burden was particularly high in Apulia (IT). The effectiveness of Article 46 of Regulation (EU) No 1305/2013 can be called into question in the case of derogations allowing a net increase of an irrigated area especially where a waterbody has been assessed as less than good regarding quantity. As a result, the considerable administrative burden associated with this measure can appear disproportionate given the absence of clear results.

### **5.10.4.5 CAP instruments and measures supporting farmers' awareness and knowledge or promoting collaborative actions**

Some specific measures have also been judged too complex by some Member States which have avoided their use because of their administrative burden. This has been the case for the soft measures, M1 and M2. Spending on M1 'Knowledge transfer' decreased compared to the previous period in sixteen Member States (Dwyer et al., 2016). The administrative difficulties mentioned by Member States with this measure are the requirement for formal tendering and the restriction that funding may be paid only to a 'beneficiary' who is directly involved in the knowledge transfer concerned. This has caused difficulties in Member States such as France, where the use of organisations such as Chambers of Agriculture as an intermediary is commonplace and they could not apply for M1 payments before 2018.

Nineteen Member States decreased their expenditure on M2 'Advisory services' compared to the 2007-2013 period (Dwyer et al., 2016). As for M1, service providers under M2 had to be selected through a call for tender and were required to be the only provider of the relevant advice or training in the Region/Member State. As a result, and to limit administrative burden, some Managing Authorities decided not to programme the measure. This is the case for example with various regions in France, Saxony-Anhalt (DE) and Czechia. Other Managing Authorities which did open the measure received no applications since no potential applicant had the capacity to cover the entire territory. This was the case in Spain. The 'Omnibus' regulation of 2017 has corrected some of the issues related to the implementation of these measures, as shown in the next section. Overall, the design of both M1 and M2 from 2014 to 2018 failed to take into account the very different situations of advisers and training providers across the EU. This was especially a problem in Member States such as Spain and Czechia, where there are no alternative sources of public funding for farm advice and where, in the absence of CAP provisions, the task falls to private providers who are unlikely to offer advice about water-resource protection due to low profitability.



In the Netherlands, regarding M1 and 16, the Water Boards mentioned that 30 to 40% of the project budget corresponds to administrative management and that the dates of calls for projects and the cycle (around 6 months) before receiving an answer and funds is not coherent with either the agricultural year cycle or with the dynamics of farmer collectives.

Still, M1 and M2 were in some case studies shown to be an effective tool for water protection: in Croatia, the Netherlands, Austria and Romania, for instance, they supported the FAS (see ESQ 1) and could be more used if the administrative burden associated was not so high. For the FAS, only in Spain it was mentioned that there were some difficulties in implementing this instrument, but the system currently operates well.

### **5.10.5 ADMINISTRATIVE BURDEN OF THE CAP INSTRUMENTS AND MEASURES COMPARED TO THEIR RESULTS**

The following analysis is based on legal provisions, case-study interviews and findings from previous studies at the EU level. It aims at assessing the extent to which simplification in implementation of the water-relevant measures occurred between the 2007-2013 and 2014-2020, leading to a decrease in administrative burden.

#### **5.10.5.1 Changes in the administrative burden at the CAP level**

The recent 'Analysis of administrative burden arising from the CAP' (Ecorys, 2018) concluded that CAP 2013 increased the overall administrative burden of the CAP, and that this increase in the administrative burden was heavier on administrations and not significant for beneficiaries.

The following paragraphs investigate more in detail the changes in administrative burden specific to the CAP instruments relevant to water quality.

#### **5.10.5.2 Changes in the administrative burden related to the implementation of the greening measures**

According to the analysis of administrative burden arising from the CAP (Ecorys, 2018), the implementation of the greening measure, starting from 2014, has created new administrative burden for the following:

- Farmers, must gather additional information on practices required, communicate with farm advisers and/or competent authorities, and fill in forms and maps.
- Public authorities, on the other hand, face administrative burden in adaption of the administrative system and tools, activities to inform farmers, communication and assistance to farmers and checks for the compliance with greening conditions. In particular, additional costs linked to on-spot verifications for EFA requirements appeared to be significant.

The overall administrative costs linked to greening measures were particularly high during the first implementation year, when both farmers and competent authorities had to become acquainted with new tasks.

Some simplifications of the greening measures have occurred since 2015, in relation to the 'Omnibus' Regulation (EU) 2017/2393, Regulation (EU) 2017/1155, 'On The Spot Check' (OTSC) Guidelines, EFA Guidelines and LPIS Guidelines. The simplifications affecting measures relevant to water quality are summarised in the table below.

**Table 66: Simplification of the water-related greening measures implemented since 2015**

Item	Content	Source
<b>Crop diversification</b>	Regional or subregional control periods for crop diversification permitted.	Reg. (EU) 2017/1155 (Art. 1 (3))
	Possibility to count mixed crops as well as single species.	Reg. (EU) 2017/1155 (Art. 1 (3))
	Exemption of farms with more than 75% of cultivated land in grassland or leguminous plants.	'Omnibus' regulation (EU) 2017/2393
<b>Landscape elements / Buffer strips and field margins, etc.</b>	Simplification of the size criteria for certain elements.	Reg. (EU) 2017/1155 (Art. 1 (4))

Item	Content	Source
<b>Buffer strips and field margins, etc.</b>	Simplification of the possibility to use the area.	Reg. (EU) 2017/1155 (Art. 1 (4))
<b>Payment reductions in the event of non-compliance</b>	Simplification of the calculation of administrative reductions.	Reg. (EU) 2017/723 (Art. 1 (3,4))
<b>EFA</b>	Compensation for absent or non-qualifying EFAs by another EFA (type and location can be modified by the farmer to a certain degree after the aid-application).	OTSC Guidelines
	Not all potential permanent EFAs have to be mapped in the EFA layer.	EFA Guidelines
	No longer need to distinguish between hedges or wooded strips and trees in line Merged EFA in amended delegated regulation.	EFA Guidelines and Reg. (EU) 2017/1155 (Art. 1 (4))
	Allows gaps in hedges or wooded strips of up to 4 metres.	EFA Guidelines
	Adjacent landscape features can be located within 5-m buffer around agricultural parcel.	EFA Guidelines
<b>Permanent grassland</b>	Reduced requirement for identification in the LPIS of areas with PG-ELP (Permanent Grasslands with Established Local Practices).	LPIS Guidelines

Source: Alliance Environnement compilation based on regulations mentioned in 3<sup>rd</sup> column

Still, some of the case studies indicated a high level of administrative burden associated with the water-relevant greening measures. For instance, the ban on pesticides on EFAs was mentioned as a new source of administrative burden, especially due to verifications. In Austria, according to national authorities, the pesticide ban on EFAs increased administrative work and verification complexity. In North Rhine-Westphalia (DE) as well, farmer representatives pointed out that EFAs were especially associated with higher administrative burden for farmers, linked to the need for documentation. It should however be noted that this ban is still a positive element when considering the effectiveness of the EFA measure to protect water from agricultural pollution.

### 5.10.5.3 Changes in the administrative burden related to the implementation of the Rural Development measures

According to the report on the Research for AGRI committee on programmes implementing the 2015-2020 Rural Development Policy (Dwyer et al., 2016), the new framework for the strategic planning of RDPs and the other ESIFs has introduced more complexity and administrative burden into the programming process. The requirements for clear identification of the needs, targeting of support and attribution of spending to Focus Areas and objectives are important in securing value for money. But the evaluation of the impact of the CAP on climate change (Alliance Environnement, 2017a) demonstrated that Member States and Managing Authorities had found this additional strategic planning activity demanding. Indeed, the complexity involved has led some of them to programme fewer measures in their RDPs than in the previous programming periods, and to fund some actions through national funds instead (e.g. NL, DE), to focus measures on a few FAs to simplify monitoring (e.g. FR-Aquitaine), or to avoid tailoring measures to local needs.

For each measure, case studies indicated significant administrative burden resulting from the change of the RD framework. Some directly derive from the new CAP framework. The familiarisation of farmers and administrations with the new support rules and selection and eligibility criteria of water-related RD measures of each RDP was time-consuming. This was especially mentioned for the implementation of Article 46 of Regulation (EU) No 1305/2013. For instance, in Apulia (IT), the Managing Authority was unfamiliar with new requirements from that Article, which led to misunderstanding and interpretation by national and regional authorities, resulting in a major increase in administrative burden. It was mentioned in Poland and France that M4.4 (environmentally focused non-productive investments) brought more complicated application procedures and forms, when compared to previous M4 focusing on technological issues (investments in machinery, etc.). In Aragon (ES) and Poland, the installation of water meters as a prerequisite to access the subsidies for investments in irrigation systems and infrastructures promoted by M4.1 and M4.3 led to considerable administrative burden on the farmer side, according to interviewees.

Then, in the previous programming period, it was possible to combine several measures on one project using only one application. But this is not possible within the current CAP. In the Netherlands,

interviewees mentioned that it is a new source of administrative burden, especially in the case of a multifaceted collective.

The 'Omnibus' regulation of 2017 introduced some changes aiming to limit the level of administrative burden, especially linked to M1 and M2 implementation presented in the section above (5.10.4.5). Indeed, the Managing Authority can now be the beneficiary of the measure, and the requirement for open tendering to select beneficiaries has been removed. It has been replaced by a selection procedure open to both public and private bodies. Still, according to some interviewees (e.g. in France), these changes were introduced too late, as Managing Authorities had already decided to finance these advisory services using alternative funds (e.g. from the Region and Water Agency in the case of Alsace (FR)).

#### **5.10.6 REPLY TO THE ESQ 9 ON THE EFFICIENCY OF WATER-RELEVANT CAP INSTRUMENTS AND MEASURES FOR WATER QUALITY**

The reply to ESQ 9 is based on findings from the effectiveness analysis results, FADN and CMEF indicators, and mostly from the analysis of literature and case-study interviews.

It shows that greening measures and cross-compliance entailed few opportunity costs, except for highly specialised farms. Moreover, when needed, RDP measures were used to support farmers to become compliant with GAECs and SMRs during the first year of implementation within the framework of Article 17(6) of Regulation (EU) No 1305/2013. These instruments generated high administrative burden on the farmer side, mostly related to the understanding and the documentation for the greening and cross-compliance rules, even if the 'Omnibus' regulation brought simplification to greening payments. Direct costs of these schemes, i.e. the payments granted to the beneficiaries, are assessed as low, when considering greening payments as a share of direct payments, which is conditional upon compliance of farmers with environmental and climate obligations. Cross-compliance cannot be associated to any direct costs. The efficiency of cross-compliance and greening payments was therefore assessed as high with regard to their positive results for maintaining beneficial practices for water protection. The assessment would differ if the 30% share of direct payments were to be considered as direct cost made under greening payments.

As for RDP measures, payment rates granted under M1 'Knowledge transfer' and M2 'Advisory services' were found to be set at an efficient level. For these measures, collective approaches (ES, HR, AT) made it possible to support more farmers at a lower cost. However, the high level of administrative burden associated with M1 and M2 often discouraged their implementation or uptake, and the situation was very similar for M16 'Cooperation'. The 'Omnibus' regulation brought simplifications during the programming period for M1 and M2, but they occurred too late to enable significant implementation of the measures during the programming period according to some interviewees. Moreover, as these measures are quite effective in protecting water, they can be considered as relatively efficient, despite their relatively infrequent use.

In many Member States, the calculation of the payment rate of M10.1 AECM fails to cover the opportunity cost for highly productive farms, while in others (e.g. Finland, Croatia and Apulia (IT)) transaction costs are covered or limited, as for instance in the Netherlands due to a collective approach. Targeting AECMs on relevant beneficiaries/geographical areas regarding water issues has improved its efficiency in some Member States. Forestry measures M15.1 and M8.1 generally fail to cover transaction costs. Also, the level of adoption of M15.1 seems to be linked with the amount of support provided per hectare. M10.1, M15.1 and M8 generated high administrative burden that is mostly necessary but could nevertheless be improved.

M11 Organic farming supports farming practices that are more remunerative in half of the case-study Member States. Even if it is associated with little administrative burden, the efficiency of this measure to protect water from pollution varies among Member States. Nevertheless, it seems that Member States consider that there are enough environmental advantages in this farming system to induce them continuing financing it, even if some have stopped their support to its maintenance (e.g. France).

Regarding M4 Investments support, the types of operation beneficial to water quality (e.g. precision farming equipment) supported under M4.1 and M4.3 do not always improve productivity, and thus the payment rate of these measures was sometimes found to be too low. M4 also generated high

administrative burden according to interviewees and appears not very efficient to protect water from pollution considering the direct costs involved.

### **5.10.7 REPLY TO THE ESQ 10 ON THE EFFICIENCY OF WATER-RELEVANT CAP INSTRUMENTS AND MEASURES FOR WATER QUANTITY**

The reply to ESQ 10 is based on findings from the effectiveness analysis results, FADN and CMEF indicators, and mostly from the analysis of literature and case-study interviews.

Most of the CAP measures and instruments that have been assessed as efficient to improve water quality can have an effect on water quantity as well, when they improve water retention in soil (e.g. reduced tillage), decrease runoff (e.g. soil cover) and enhance bank stabilisation (e.g. buffer strips). Therefore, the analysis provided in the previous section is still valid when considering their efficiency with regard to the objective of improved quantitative management of water.

However, GAEC 2 on water-use authorisation and investments support granted under M4 for irrigation systems are specific tools targeting more efficient use of water.

GAEC 2 ensures that water abstracted for irrigation complies with authorisation procedures, determined at Member State level. Even if the costs of verification are limited, the items checked on the spot do not always prevent excessive abstraction by farmers<sup>98</sup>. For M4.1 and 4.3 support for water quantitative management, the targeting is ensured by Article 46 of Regulation (EU) No 1305/2013, which sets eligibility rules for support for investments in irrigation systems and infrastructures. However, these rules are not very restrictive, since they allow farmers to increase their irrigated areas, even where the status of waterbodies is 'less than good'. Conditions set by Article 46 of that Regulation for irrigation investment measures require reduction of the total amount of water abstracted at farm level (even in the event of increased irrigated area), as demonstrated *ex-ante*. The administrative burden generated by the Article 46 requirements did not lead to effective reduction of water, and the results were deemed as insufficient according to the stakeholders interviewed.

### **5.11 RELEVANCE - ESQ 11: TO WHAT EXTENT DO THE CAP OBJECTIVES RELATED TO SUSTAINABLE MANAGEMENT OF NATURAL RESOURCES AND CLIMATE ACTION CORRESPOND TO THE ACTUAL NEEDS AT EUROPEAN, MEMBER STATE AND FARM LEVEL IN RESPECT OF WATER QUALITY AND WATER QUANTITY?**

#### **5.11.1 UNDERSTANDING OF THE QUESTION AND METHODOLOGICAL APPROACH**

Relevance identifies the strength of the relationship between the CAP design and the needs identified at the EU, national, river-basin and farm level, thereby determining the extent to which the policy objectives and measures are implemented appropriately to address the identified needs. The measures considered for ESQ 11 are the CAP measures and instruments aiming at the sustainable management of natural resources and climate action in Pillars I and II as well as in the Horizontal Regulation.

The ESQ requires the specific needs related to sustainable water management and agriculture to be identified at the EU, Member State, RDP Management Authorities, River Basin District and farm level. The needs in sustainable water management that will be considered in this ESQ are the actions required from the agricultural sector, so that the goals of sustainable water management defined in the WFD can be achieved by each Member States (EC, 2000), i.e. to achieve good status for all waterbodies in 2015 (or 2021 or 2027 for those that had exemptions).

To answer this ESQ, the objectives of the CAP measures<sup>99</sup> were compared to the needs at the EU, Member State and farm level (qualitative analysis). For each level of analysis, the needs were identified

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<sup>98</sup> Only the obtaining of a water licence is checked in all of them, and only eight case-study Member States verify the compliance of farmers with the authorisation order (ES, FR, HR, IT, NL, PL, RO, FI).

<sup>99</sup> The uptake and the results of the measures is not considered in this ESQ. Indeed, as defined in the Better Regulation guidelines, relevance analysis shall consider 'the relationship between the needs and problems in society and the objectives of the intervention and hence touches on aspects of design'.

based on various relevant sources (RBMPs<sup>100</sup>, WISE-WFD database, literature review, RDP SWOT analysis and list of needs, interviews with case-study experts, etc.) and compared to the objectives of the measures as designed at the EU level and implemented at Member State or regional level. The analysis at Member State level focused on the case-study Member States, but information and emblematic examples from other Member States were also considered when available (e.g. based on literature review, previous evaluations, WISE-WFD database, etc.).

Pillar II budget allocations to water-related focus areas and priorities<sup>101</sup> (at Member State level) were compared to the qualitative and quantitative state of water bodies (at River Basin level, based on WISE-WFD database), in order to quantify the extent to which Pillar II budget allocation reflects water-related needs at Member State level (quantitative analysis). The ESQ presents the main results from this analysis.

### 5.11.2 RELEVANCE OF CAP OBJECTIVES AT THE EU LEVEL

The following table presents the main needs regarding water (in quality and quantity) and agriculture at the EU level, and the CAP measures and instruments which may address these needs. All these needs can be addressed by at least one CAP measure or instrument (see table below). No gaps have been identified at the EU level, since all needs can be covered by at least one measure or instrument (see table above). However, this relevance analysis is only theoretical, and the actual objectives targeted by the measures depend on the implementation choices of Member States/Managing Authorities and their own objectives. The following section considers these implementation choices to assess the actual relevance of the CAP to Member States or case-study regions' needs.

**Table 67: Main needs with regard to water (in quality and quantity) and agriculture at the EU level, and CAP instruments and measures addressing these needs, according to relevant provisions and documents**

Category	Needs stressed by relevant regulations	CAP measures addressing these needs
<b>Water quality</b>	To reduce the pollution of water caused or induced by the <b>application and storage of inorganic fertiliser and manure on farmland</b> and prevent further such pollution to safeguard drinking water supplies and to prevent wider ecological damage through the <b>eutrophication of freshwater and marine waters</b> (Nitrates Directive 91/676/EC).	Greening EFA and permanent grassland, GAEC 1, GAEC 3, SMR 1, SMR 10, FAS, M1, M2, M4, M10, M16
	To enhance the status and prevent further <b>deterioration of aquatic ecosystems and associated wetlands</b> , promote the sustainable use of water and reduce water pollution (Water Framework Directive 2000/60/EC).	GAEC 1, GAEC 3, SMR 1, SMR 10, FAS, M1, M2, M7, M10, M11, M12, M16
	To protect the environment as a whole, and human health in particular, detrimental concentrations of <b>harmful pollutants in groundwater</b> must be avoided, prevented or reduced (Groundwater Directive 2006/118/EC).	GAEC 3, SMR 1, SMR 10, FAS, M1, M2, M10, M11
	To reduce risks and impacts of pesticide use on human health and the environment and encourage the development and introduction of integrated pest management and of alternative approaches or techniques in order to <b>reduce dependency on the use of pesticides</b> (Sustainable Use of Pesticides Directive 2009/128/EC).	GAEC 3, SMR 1, SMR 10, FAS, M1, M2, M4, M10, M11, M16
<b>Water quantity</b>	To <b>reduce the probability of flooding</b> and its potential consequences (Floods Directive 2007/60/EC).	FAS, M1, M2, M5, M10, M16
	To promote the sustainable use of water and to <b>mitigate the effects of droughts</b> (Water Framework Directive 2000/60/EC).	GAEC 2, FAS, M1, M2, M4, M10, M16
<b>Soil erosion</b>	To protect, conserve and enhance the EU's natural capital: Land is managed sustainably in the Union, soil is adequately protected [through] increasing efforts to <b>reduce soil erosion and increase soil organic matter</b> (Seventh Environmental Action Programme - DECISION No 1386/2013/EU).	GAEC 4, GAEC 5, GAEC 6, GAEC 7, FAS, M1, M2, M10, M16

Source: Alliance Environnement, based on EU regulations

<sup>100</sup> The second RBMPs (published in 2018) have been considered. The level of monitoring of the status of groundwater bodies has largely improved between the first and second RBMPs, and hence the information is more complete in the second RBMPs.

<sup>101</sup> 4A Restoring, preserving and enhancing biodiversity; 4B Improving water management, including fertiliser and pesticides management; 4C Preventing soil erosion and improving soil management; 5A Increasing efficiency in water use by agriculture; 5D Reducing greenhouse gas and ammonia emissions from agriculture; 5E Fostering carbon conservation and sequestration in agriculture.

It should be noted that the greening measure on crop diversification is not listed in the table among CAP instruments and measures available to address the needs regarding water quality and quantity. Indeed, crop diversification does not prevent farmers to keep growing the same crop on the same land, which induce increased use of fertilisers and pesticides. The greening measure on crop diversification could better address fertilisers and pesticides use by requiring crop rotation rather than crop diversification.

The GAECs and greening measures concern only farmers eligible for basic payments under Pillar I. As explained in box 5 of section 5.4.2.2, sectors with the highest impact on water quality and quantity (e.g. fruits, flowers, wine) are not always eligible for direct payments depending on the Member States and thus not subject to corresponding greening and GAEC requirements. Moreover, greening obligations do only apply on permanent crop areas of farms.

### **5.11.3 RELEVANCE OF CAP OBJECTIVES AT MEMBER STATE (OR REGIONAL) LEVEL**

#### **5.11.3.1 Needs and priorities with regard to water**

The water-related needs have been identified in case-study Member States or regions, based on a review of their RBMPs,<sup>102</sup> the WISE-SoW database, the relevant literature, their RDP SWOT analysis and list of needs and case-study interviews with experts.

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<sup>102</sup> The second RBMPs (published in 2018) have been considered. The level of monitoring of the status of groundwater bodies has largely improved between the first and second RBMPs and hence the information is more complete in the second RBMPs.



**Table 68: Needs identified with regard to water and agriculture in case-study Member States or regions**

Needs identified	NRW (DE)	Aragon (ES)	Alsace (FR)	HR	Apulia (IT)	NL	AT	PL	RO	FI
<b>Water Quality</b>										
1. Water pollution (from nutrients, chemicals or pathogen agents)	X	X	X	X	X	X	X	X	X	X
2. Improve the state of aquatic ecosystems and associated wetlands	X		X	X	X	X	X	X		X
3. Improve access to drinking water									X	
<b>Water quantity</b>										
4. Reduce water abstraction and improve efficiency of water use		X		X	X		X	X		
5. Restore and improve irrigation infrastructure to improve efficiency		X		X	X			X	X	
6. Prevent bank and soil erosion and losses of soil organic matter	X	X	X	X	X	X	X		X	X
7. Mitigate flood risks			X	X					X	X
8. Anticipate climate change and its impacts on water		X	X			X	X	X	X	X
<b>Water quality and quantity</b>										
8. Anticipate climate change and its impacts on water <sup>103</sup>		X	X			X	X	X	X	X
9. Increase awareness/develop knowledge and technical capacity of farmers to favour sustainable water	X		X	X		X		X	X	X

**Legend:** X - need identified in the RBMP, RDP SWOT analysis, or other relevant sources (EC Reports on the implementation of the Second River Basins Management Plans in case-study Member States,<sup>104</sup> WISE-SoW database, LUCAS data on soil erosion, interviews with environmental experts)

### 5.11.3.2 Relevance of implementation decisions by Member States and managing authorities to these needs

#### CAP implementation decisions in case-study Member States and regions and relevance to their needs

In the framework of their RDPs, Managing Authorities are required to identify the needs of the area covered and propose a coherent strategy to meet them through the implementation of their RDP (choice and design of the measures, setting of targets, budget allocation, etc.). There is no similar requirement under the horizontal measures and Pillar I provisions, which means that Member States are not required to identify their needs and justify the list of authorised practices under the greening measures and cross-compliance. However, a certain degree of subsidiarity is left to Member States to implement these instruments, and this subsidiarity<sup>105</sup> may favour relevance if environmental considerations prevail in implementation choices (Ecorys *et al.*, 2016). Furthermore, the decision to manage RDPs at regional level (e.g. in DE, ES, FR, IT) can also favour the relevance of the measures to local needs, especially in large Member States where regions and river basins can have very different context and issues.

The Managing Authorities may target their intervention with the CAP instruments to some priorities and also implement specific measures (e.g. based on national policies) to address other needs. In Germany, the Federal State government has passed an ordinance which addresses soil erosion protection needs<sup>106</sup>. In France and the Netherlands, the Water Agencies have their own budget to support actions targeting the agriculture sector (e.g. information actions to raise farmers' awareness on water issues). Furthermore, for fertilisers use in Germany, the Federal Fertiliser Ordinance is the national legal authority for determining Good Agricultural Practice. In Romania, the World Bank-funded Integrated

<sup>103</sup> Irrigation demand is projected to increase, and water availability is projected to decrease, in particular in southern Europe, where there is already considerable competition between different water users. The increase in temperature is also expected to boost the incidence of crop pests and animal diseases. On top of that, the increase in the occurrence of extreme events (heat waves, droughts and floods), which is already happening, is expected to raise the risk of hydromorphological alteration of watercourses through heavy rainfall and landslides.

<sup>104</sup> Commission Staff Working Document - Second River Basin Management Plans – Accompanying the document report from the Commission to the European Parliament and the Council on the implementation of the Water Framework Directive (2000/60/EC) and the Floods Directive (2007/60/EC).

<sup>105</sup> Article 5 of the Treaty on European Union.

<sup>106</sup> The ordinance identifies land particularly vulnerable to erosion and restricts management practices on these pieces of land.

Pollution Control Project (INPCP) offers a suite of well-targeted and tailored interventions specific to helping small farms to comply with the Nitrates Directive.

The Managing Authorities' implementation choices have been analysed for case-study Member States and regions and compared to the needs identified. Among CAP measures and instruments, the main ones used to tackle water issues are the Pillar I greening measures, the cross-compliance rules and RDP measures. Member States' implementation choices for these measures and instruments relevant for water are detailed in ESQ 1. The following table presents the main findings from the assessment of the relevance of the CAP measures and instruments implemented in case-study Member States in relation to their needs as regards sustainable water and agriculture.

**Table 69: Scoring matrix of the relevance of case-study Member State (or region) CAP objectives to their actual needs in water quality and water quantity.**

Needs identified	NRW (DE)	Aragon (ES)	Alsace (FR)	HR	Apulia (IT)	NL	AT	PL	RO	FI
<b>Water quality</b>										
1. Water pollution (with nutrients, chemicals or pathogen agents)										
2. Improve the state of aquatic ecosystems and associated wetlands										
3. Improve access to drinking water										
<b>Water quantity</b>										
4. Reduce water abstraction and improve efficiency of water use										
5. Restore and improve irrigation infrastructure to improve efficiency										
6. Prevent bank and soil erosion and losses of soil organic matter										
7. Mitigate flood risks										
<b>Water quality and quantity</b>										
8. Anticipate climate change and its impacts on water										
9. Increase awareness/develop knowledge and technical capacity of farmers to favour sustainable water										

	Not identified as a need.
	CAP measure objectives as implemented by the MS/Managing Authority are relevant to this need.
	CAP measure objectives as implemented by the MS/Managing Authority are somewhat relevant to this need.
	This need is not addressed by any CAP measure as implemented by the MS/Managing Authority (gap).

Source: Alliance Environnement, based on case studies

Two differences between objectives and needs have been identified in case-study Member States or regions, in terms of their CAP implementation decisions, but in both cases the needs are covered by national aids:

- In Poland, where drought impacts are expected to increase in the future (linked to climate change), a large share of the irrigation facilities are out of order due to lack of proper maintenance, and no CAP instrument or measure addresses this issue at present. In fact, support for improving irrigation equipment was transferred to the water body in charge of the implementation of the WFD.
- In North-Rhine-Westphalia (DE), water-related knowledge transfer and advisory services are not supported through the CAP due to administrative burden and because other services are available (see ESQs 9 and 10). Advisory services are made available to farmers by the water abstraction company (concerning water quality and how to limit nutrient pollution, etc.) or provided by the Chamber of Agriculture (to adjust farmers' management of water taking into account the legal framework and cost pressure).

In addition, no measures on the use of pharmaceutical products to keep animals healthy or of cleaning products used extensively on farms (e.g. to wash out equipment in milking parlours) have been identified in case-study Member States<sup>107</sup>.

<sup>107</sup> The RDP measures M4 (for investments for improving farm biosecurity) and M14 could be used to promote practices or investments favouring reduced use of pharmaceutical or cleaning products. No such case has however been found in case-study RDPs. Furthermore, the special report from the ECA on animal welfare in the EU does not mention any examples.

Furthermore, some needs appear to be only partially addressed in several case-study Member States (or regions):

- According to WISE-SoW data, more than 50% of surface waters fail to achieve ecological good status in most case-study river basins, except for the Ebro in Spain and the Danube in Romania. Yet, in case-study Member States and regions, only few examples have been found of RDP measures designed to protect water ecosystems (e.g. AECM sub-measures in FR<sup>108</sup>, NL and FI, the sub-measures M4.4 and M7.6 and the measure M12 in Austria<sup>109</sup>). However, even though the implementation of the CAP measures does not directly target the improvement of the waterbodies' ecosystems, it indirectly tackles this challenge by favouring the improvement of water quality.
- The M1 and M2 objectives consider water-related challenges in many Member States or regions (e.g. Extremadura (ES), Aragon (ES), SI, FI, Scotland (UK)) (Ecorys *et al.*, 2016). In some cases, M1 and/or M2 target priority areas for water challenges, thereby enhancing the relevance of the measure (e.g. in NL and SI). However, in several case-study Member States, the environmental issues tackled by the advisory services remain vague in their descriptions, mentioning resources protection, environment or no specific subjects (e.g. HR, IT, AT and PL). According to interviews in Poland, farmers' representatives have limited knowledge of the needs identified in the RBMP, and the training provisions connected with the Water Framework Directive for farmers are limited and do not address the needs.
- In Aragon (ES), no RDP measure specifically targeting water pollution has been identified, but this need is addressed through the greening measures and cross-compliance. According to the Managing Authority, AECMs have a clear bias towards restoring and improving biodiversity, landscape and agrarian systems of high natural value, and also towards preventing soil erosion. Less importance has been given to actions for the improvement of water management, including the management of fertilisers and pesticides. In Alsace (FR), the recent studies revealed that the quality of groundwater has deteriorated, whereas the 10 main pesticides found in large quantities are herbicides used for maize cultivation and their metabolites (e.g. atrazine, nicosulfuron, S- metolachlore, bentazone). However, in France, the equivalence scheme to the crop diversification measure (under greening measures) allows maize monocropping, which increases maize acreage and potential related pressures on water, but this is completed by an obligation of soil cover during winter.
- To address soil erosion issues, specific practices must be fostered, especially no or reduced tillage practices, soil cover, maintenance of stubble, and the implementation or maintenance of hedges, etc. Such practices are supported in most case-study RDPs (all except NL RDP) through the AECM measure. GAEC standards 1 and 5 are also particularly relevant for addressing soil erosion issues. However, in Italy and the Netherlands, under GAEC 1 there is no requirement on the degree of slope beyond which restricted soil working is required. In addition, in these two Member states, GAEC 5 (which targets soil erosion) does not check whether there is no tillage on waterlogged or sloped plots. In Finland, 'subsequent damages from livestock trampling' are checked under this GAEC, which helps to prevent erosion and morphological alteration along watercourses. The issue of livestock trampling along watercourses should be more generally addressed by GAEC 5 in other Member States.
- Adaptation to climate change is identified in the objectives of advisory measures in Central and Eastern EU Member States (e.g. HR, PL and RO), where experts predict less rain in summer and higher risk of river floods. However, the evaluation of the CAP on climate change carried out in 2018 (Alliance Environnement, 2017a) showed that CAP implementation choices only partially address the needs expressed at the EU and Member State levels.

Finally, some implementation decisions appear to be particularly relevant in addressing local needs. For instance, in Finland, the Pillar II Agri-Environment-Climate Measures (M10) include several measures tackling water pollution issues and are targeted to specific regions to ensure the relevance to local needs (see box below). Furthermore, in Member States where it is available, M11 Organic farming can address

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<sup>108</sup> However, according to the French Ministry of Environment, this measure is not sufficient to address the need of wetlands protection.

<sup>109</sup> The sub-measure M4.4 supports non-productive investments for the ecological improvement of waters in agricultural regions, and the sub-measure M7.6 supports the preservation, improvement and restoration of valuable nature conservation areas (one eligibility criterion mentions initiatives contributing to the protection of wetlands). The measure M12 supports operations in Natura 2000 network and may include operations relevant to water.

water quality needs. Most case-study Member States (all except HR and NL) allocated a high share of their planned budget to this measure (see ESQ 1).

### Box 11: Implementation of targeted AECMs for water protection in Finland

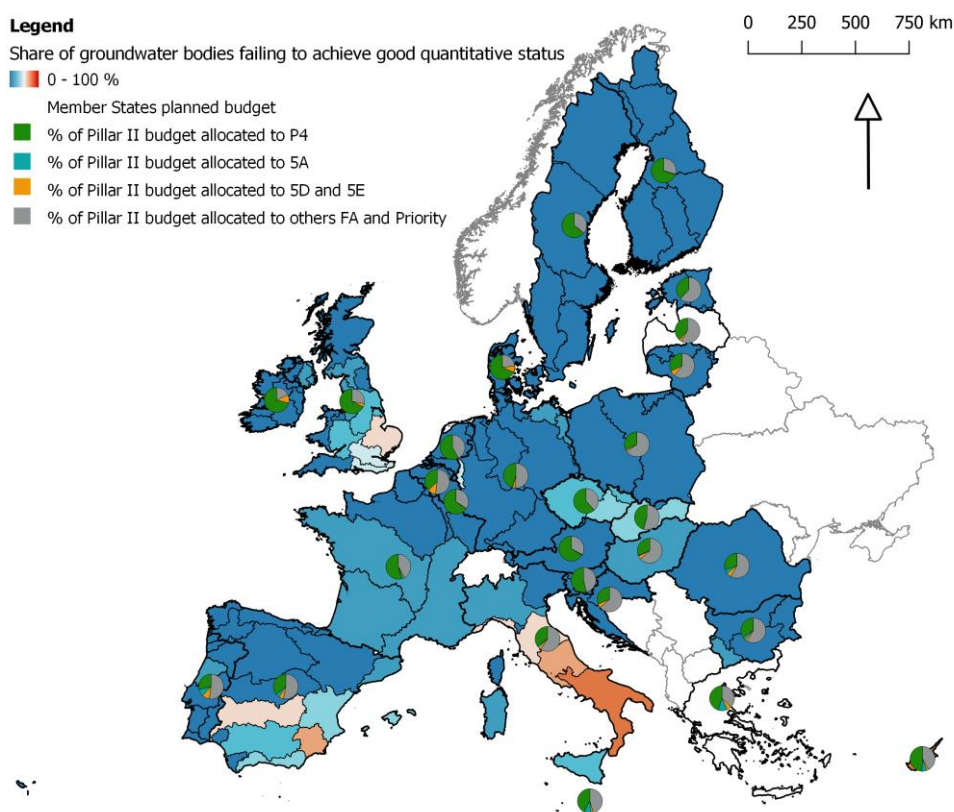
In order to better target water issues in Finland, the AECM sub-measures have been implemented based on a regional targeting of water protection needs. For instance, in one targeted region the payment rate for the implementation of riparian zones and the environmental management of grasslands is higher than elsewhere. Another targeted region considers plant cover on arable land in winter and aims to increase the organic matter content in the topsoil of arable land. More protection measures are available in this targeted region. For instance, it is possible to obtain support for implementing the measure on 80% of the arable land, whereas 60% is the highest rate in other parts of Finland. Furthermore, farmers in the targeted region obtain a higher payment rate for implementing winter cover.

Some Member States purposely addressed water issues specific to their local context. As part of the Pillar I greening measures, Germany and the Netherlands decided to require farmers to sow catch and cover crops after EFA nitrogen fixing crops, in order to avoid nitrogen leaching. In these two Member States, nutrient pollution of water is a major issue to be addressed (see chapter 1), and this implementation choice is fully relevant to this context. In addition, in Germany and Poland, the catch and cover crops declared as EFA must be maintained over winter, which is relevant to reduce erosion.

### Proportionality of the RD budget with the challenges of water quantity and quality

The analysis of RDP budget allocations shows that all Member States have allocated significant budget to Priority P4 (restoring, preserving and enhancing ecosystems) (see ESQ 1), including Member States concerned by water quality issues (for their ground- or surface-water) or failing to achieve good ecological status. According to Wise SoW data, the quantitative status of groundwater has been assessed as bad in most waterbodies in several river basins in Italy, Spain and the UK. Only limited budget is allocated to the focus area 5A which targets water use efficiency by agriculture. However, this need may be addressed through actions on soils (to improve their water-retention capacity) or on water management (under P4).

**Figure 21: State of groundwater bodies in EU river basins and RDP budget allocation in relation to water quantity at Member States level**



Source: Alliance Environnement based on WISE SoW database and AIR data

## **Strategies improving the relevance of the operations supported by the RDPs to address water-related issues**

The analysis of case-study RDPs shows that their identification of the needs is coherent with the orientations of the RBMPs, even though RBMPs are generally more comprehensive in their description of the local context (geographic details, local weather, etc.) and specific needs (e.g. in Aragon (ES), Alsace (FR), NL and FI). In Finland, the fact that the RBMPs were developed parallel to the CAP framework played an important role in incorporating water protection measures in the CAP and has therefore enhanced the relevance of the CAP instruments and measures to the river basin needs.

In some Member States (e.g. the Netherlands, Slovenia and Poland<sup>110</sup>), the RDP was explicitly designed and implemented to address issues identified in the local RBMPs (according to (Ecorys *et al.*, 2016) and case-study interviews), which ensures the relevance of the CAP instruments and measures to the needs identified in the RBMP. In the Netherlands, in order to ensure the relevance of the operations supported by the sub-measure M4.1, the type of operations supported had to be taken from an evidence-based national list of investments with positive impact on water. According to both the national authorities, the Managing Authorities and project coordinators, this facilitated the definition of the activities to be supported to address water issues, and ensured the relevance of the supported operations.

The RDP measures can also be targeted towards areas facing specific issues regarding water resources. For instance, some Member States have decided to target some AECM measures to projects located in NVZ (e.g. DE, IT) or in wetlands (e.g. FI) according to their needs (see Table 68 and ESQ 1). Similarly, projects including the requirements from the National Water Management Plan (AT) or from the Water Framework Directive (ES) can be prioritised under investment measure M4. As part of this same measure, some Member States have decided to focus on projects located in wetlands and flood zones (FI), where the quantitative status of waterbodies is lower than good (IT) or in waterbodies suspected not to achieve environmental objectives of the RBMP for Nitrates and pesticides parameters (FR). Investments in physical assets can also be eligible if an irrigation infrastructure were identified as economically viable (RO). All these eligibility and selection criteria, when adapted to the local needs, enhance the relevance of the water-related measures.

### **5.11.4 RELEVANCE OF CAP OBJECTIVES AT FARM LEVEL**

#### **5.11.4.1 Farmers' needs and priorities in water quantity and quality**

Economic and competitiveness considerations bear significant weight on farmers' needs in water management. More specifically, farmers require the following:

- Access to enough water to cover their needs all year round (including in summer). This is particularly relevant for irrigated land located in areas concerned by over-abstraction of water relative to water availability, or which may face worsening conditions in the future as a consequence of climate change. In this respect, Spain and Hungary are the two Member States where pressure from abstraction is the most significant (they both registered 30% of SWBs subject to pressure, at least part of the year), followed by Cyprus (24%) and Bulgaria (21%).
- Access to non-polluted water for various uses such as irrigation or for livestock troughs. However, there is not necessarily a direct link between the waterbodies which can be impacted by farmers' practices (e.g. pesticide use, etc.) and the quality of the water they use, as the quality depends on the source of this water. Therefore, farmers may not always yield private benefits from the reduction of their impact on water quality.
- Adaptability to changes in legal provisions or market-related developments to which water is linked, or to the environment (e.g. the ban of certain pesticides or the growth of organic farming in response to societal demand). Effective support (in terms of advisory services, innovation development and financial support) is crucial for many farmers to adapt to these changes (Iglesias and Garrote, 2015; Iglesias, Quiroga and Moneo, 2012; Ortega, De Juan and Tarjuelo, 2005; Alliance Environnement, 2018).

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<sup>110</sup> In Poland, the AECM package 2 is focused on identified areas of risk and has been designed to address the needs identified in the RBMPs and will be updated when the RBMPs will be reviewed.



#### 5.11.4.2 Relevance of the CAP measures to farmers' needs

Various practices or investments can be supported under the CAP to address farmers' needs in **water quantity**. As explained in section 5.11.3.2, in several case-study Member States, investments in equipment for irrigation can be supported (Aragon (ES), HR, AT, RO), as well as on-farm water storage (RO). No support for larger-scale water storage (e.g. dam construction to store water in winter when the resource is abundant) has been identified within the CAP framework in case-study Member States, except in France, where such projects can be supported under specific conditions. At present, no dam construction has been supported under the CAP in France due to legal procedures and blockage by environmental associations (see box below).

##### Box 12: Territorial projects for quantitative management of water resource in France

In France, in river basins concerned by structural deficit of water, **territorial projects** for quantitative management of water allow stakeholders to **act collectively in order to achieve sustainable management of the resource**. These projects must include an assessment of water needs for all the activities of the territory (i.e. drinking water, tourism, fishery, agriculture, energy, industry, etc.) and then define a timetable to achieve quantitative equilibrium of the resource. Territorial projects are based on dialogue between the different stakeholders and users of the territory. Since 2015, only the catchment areas with a territorial project can obtain subsidies from the Water Agency (as part of RDP measure M4) for the construction of infrastructure for water storage<sup>111</sup>. **This requirement enhances the relevance of the investments** since the territorial context and the needs and position of the different stakeholders are taken into consideration in the decision process.

However, since the implementation of this law, many territorial projects have been drawn up, but no dams have been built to store water in winter. Most projects are blocked due to legal procedures and blockage by environmental associations. The agreement between farmer representatives and the national authorities when the law was passed in 2006 was that farmers would reduce water uptake but that this would be compensated mainly by the financing of water reservoirs. As a result, the situation remains very tense in France on the quantitative management of water. The legislative framework of the territorial projects has been reviewed in 2019 to facilitate their functioning.

Sources: (Alliance Environnement, 2018; Bisch, 2018)

Wastewater reuse is also considered by various farmers' organisation (e.g. COPA-COGECA) as a very important measure to reduce the abstraction of freshwater and to tackle the impact of climate change, bringing benefits to the environment and to farm economics (COPA-COGECA, 2018). The EU legislative framework for water reuse is currently under review (see ESQ 8). The reuse of wastewater is supported under the CMO regulation for fruits and vegetables in Croatia. No examples of similar measures to support water reuse have been identified in CAP implementation in case-study Member States or regions. However, such support can be covered by other EU policies such as the EU Cohesion fund.

Another way of helping farms to adapt to water scarcity stress episodes is to support their diversification with rainfed crops in areas prone to droughts. In Romania, measure M10 (AECM) includes a pilot measure targeting small arable farms, to promote more drought-resistant crop systems in 71 designated local authority areas in southern Romania, where arable land is considered most at risk from drought and desertification. The package aims to promote the use of more drought-resistant crops, varieties and hybrids (to spread the risk of crop damage due to lack of water) and the use of minimum tillage techniques (to improve soil moisture). However, the uptake of this innovative AECM has so far been very limited, with only one applicant registered in 2017.

Innovation development (including the dissemination of innovations) can also help address farmers' needs in **water quantity and quality**. As analysed in ESQ 8, the cooperation measure M16 or the investment measure M4<sup>112</sup> can contribute to the emergence and dissemination of technological and social innovations. Support for demonstration and knowledge-sharing actions can also be a major driver for the dissemination of innovations and efficient use of innovations. In Poland and Romania, the measure M1 specifically targets the promotion of innovations.

Some needs in water availability and quality involve significant change of practices or systems for farmers (e.g. conversion to organic farming, crop diversification, etc.). In order to support farmers, a combination of complementary measures or instruments can be relevant. For instance, advisory activities can be conducted in combination with investment support or with the implementation of an

<sup>111</sup> [http://circulaire.legifrance.gouv.fr/pdf/2015/06/cir\\_39702.pdf](http://circulaire.legifrance.gouv.fr/pdf/2015/06/cir_39702.pdf)

<sup>112</sup> In the Netherlands, innovations are specifically targeted by a type of operation called 'a guarantee for the market introduction of risky innovations' under the investment measure M4.



AECM measure (see ESQ 12 on internal coherence). Compulsory instruments (e.g. GAEC) can address water-related challenges if farmers are sufficiently informed about the requirements, their objectives and how they can adapt to compliance with these requirements. In this respect, the implementation of the FAS in support for cross-compliance implementation is relevant. Conversely, the evaluation of greening measures has shown that, in many cases, farmers have not been sufficiently informed about the measures and their objectives (Alliance Environnement, 2017c). Furthermore, in order to be adapted to farmers' needs, these measures must be adapted to their local context (e.g. soil, climate, types of production, etc.), in opposition to one-fits-all measures (Alliance Environnement, 2017c). More broadly, knowledge transfer and capacity-building actions are crucial to support farmers in any changes in their systems (with regard to both water quality and quantity) (Alliance Environnement, 2018; Iglesias, Quiroga and Moneo, 2012). As explained in section 5.11.3.1, the level of knowledge and awareness of farmers needs to be improved in most case-study Member States. The CAP horizontal instrument FAS and measures M1 and M2 are designed to address these needs. Their actual targeting of water priorities depends on Managing Authorities' implementation choices (see section 5.11.3.2).

### 5.11.5 REPLY TO THE ESQ 11

At the EU level, the CAP offers possibilities to address all the needs related to water quality improvement, including fertiliser/pesticide management and increased efficiency in water used. No gaps have been identified at the EU level, since all needs can be covered by at least one CAP measure or instrument. However, the actual relevance of the CAP instruments and measures depends on the implementation choices of Member States/Managing Authorities and specific objectives. This is especially the case for Pillar I (e.g. greening measures<sup>113</sup>) and horizontal instruments (GAECs), which can be implemented by Member States without referring to any needs or having to justify policy choices accordingly.

At the Member State/Managing Authority level, the CAP instruments and measures have been found to be more or less relevant in terms of the needs of improving water quality as shown below. The analysis of the needs identified in the case-study RDPs revealed their relevance in terms of the orientations of the RBMPs, even though some needs may be underestimated in RDPs (e.g. the need to improve the state of aquatic ecosystems and associated wetlands). The analysis of the CAP implementation choices in case-study Member States has shown that water-related needs have generally been taken into consideration by the Managing Authorities. In some cases (e.g. NL, PL, SI), the RDP measures were explicitly designed and implemented to address issues identified in their RBMPs (Ecorys *et al.*, 2016), which ensures the relevance of the measures to the needs identified in the RBMP. In other cases, measures have been targeted at areas facing specific issues in relation to the water resources, which ensure their relevance to local needs (e.g. the AECM measure in wetlands (FI) or in NVZ in (DE, IT), etc.). As regards the relevance to the need of improving the efficient use of water, the analysis demonstrated that CAP implementation choices only partially address the needs expressed at the EU and Member State levels. In the context of climate change, specific measures to foster water reuse and develop alternative crop systems are not yet sufficiently implemented by Member States. Some differences have been identified in case-study Member States or regions in terms of CAP relevance towards national issues regarding water quality and quantity, e.g. the restoration of irrigation infrastructures in Poland and the implementation of actions to raise farmers' awareness on water issues in North Rhine-Westphalia (DE), but these needs are covered by national aids. These needs were addressed outside the CAP in these specific cases. The issue of livestock trampling along watercourses should be more generally addressed by GAEC 5 in Member States, to prevent erosion and morphological alteration along watercourses. Furthermore, no measures on the use of pharmaceutical products used to keep animals healthy or on cleaning products used extensively on farms (e.g. to wash out equipment in milking parlours) have been identified in the case-study Member States. Furthermore, sectors with the highest impact on water quality and quantity (e.g. fruits, flowers, wine) are not always eligible for direct payments depending on the Member States and thus not subject to corresponding greening and GAEC requirements. Moreover, greening practices do not apply on permanent crops. However, the objective of RDPs and Pillar I instruments is not necessarily to address all needs in water and agriculture. The Managing Authorities can target their intervention with the CAP on specific needs, in coherence with other policies (e.g. national policies) addressing other needs, as in North Rhine-Westphalia (DE) or France, where advisory services were granted to farmers by the water-abstraction company or provided

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<sup>113</sup> Even if the leeway for Member States is rather limited

by the Chamber of Agriculture, both without CAP support. Then, the greening measure on crop diversification could better address fertilisers and pesticides use by requiring crop rotation rather than crop diversification.

At farm level, economic and competitiveness considerations have a significant weight in farmers' needs in water management. CAP measure objectives can correspond to farmers' needs, provided that they are adapted to their local context. When farmers need to significantly change their practices (e.g. to adapt to new water-related provisions, to climate change or to changes in societal demand), a combination of complementary measures or instruments can be relevant, e.g. support in terms of advisory actions, knowledge exchange and investment supports and other financial support.

## **5.12 COHERENCE – ESQ 12: TO WHAT EXTENT HAVE THE CAP INSTRUMENTS AND MEASURES DELIVERED A COHERENT CONTRIBUTION TO ACHIEVING THE GENERAL OBJECTIVE OF SUSTAINABLE MANAGEMENT OF NATURAL RESOURCES AND CLIMATE ACTION AND THE WATER-RELATED SPECIFIC OBJECTIVES (PROVIDE PUBLIC GOODS, PURSUE CLIMATE CHANGE MITIGATION AND ADAPTATION, INCREASE EFFICIENCY IN WATER USE BY AGRICULTURE, IMPROVE WATER MANAGEMENT, INCLUDING FERTILISER AND PESTICIDE MANAGEMENT)?**

### **5.12.1 UNDERSTANDING OF THE QUESTION AND METHODOLOGICAL APPROACH**

Coherence is defined as the extent to which the intervention under investigation does not contradict other interventions with similar or related objectives, (i.e. the interventions are not in conflict with one another, act neutrally together or are in synergy). In the framework of its general objective of sustainable management of natural resources and climate action, the CAP policy aims at addressing various specific objectives in relation to water management. These specific objectives are the following:

- increase efficiency in water use by agriculture;
- improve (qualitative) water management, including fertiliser and pesticide management;
- pursue climate change mitigation and adaptation;
- provide public goods.

This evaluation question therefore examines whether CAP instruments and measures for 2014-2020 are coherent (or not) with these water-related specific objectives. More specifically, the aim of ESQ 12 is to (a) identify the synergies and complementarity between the CAP measures and instruments on these aspects but also (b) highlight potential conflict between measures and instruments having antagonistic effects.

The first two objectives (i.e. increase efficiency in water use by agriculture and improve water management) are linked to specific practices (e.g. the use of efficient irrigation systems or the implementation of practices which limit nitrate runoff in agricultural soils). Here, the second objective is understood as the improvement of the qualitative management of water (including fertiliser and pesticide management), the quantitative aspect of water management being addressed through the first objective (i.e. increase efficiency in water use by agriculture). The last two objectives (i.e. the provision of public goods and climate change mitigation and adaptation) are more cross-cutting and can be addressed (or contradicted) in many ways, including through practices relevant to the first two objectives.

The methodological approach considered:

- the coherent contribution of each CAP instrument with the four specific objectives under study;
- the potential synergies and conflicts between the different CAP instruments and measures towards the achievement of these water-related objectives.

The analysis is based on results from the effectiveness questions, literature review and interviews during case studies. Coherence judgements are made in qualitative terms for each measure-objective and measure-measure association according to whether the relationship is a) synergistic or complementary; b) neutral; c) mixed; d) in competition or contradictory. Findings are presented in a summary table using a colour-coded system to represent the relationships.

### **5.12.2 COHERENCE OF CAP INSTRUMENTS AND MEASURES WITH THE SPECIFIC OBJECTIVE OF IMPROVING WATER MANAGEMENT (IN TERMS OF QUALITY), INCLUDING FERTILISER AND PESTICIDE MANAGEMENT.**

#### **Horizontal Measures (cross-compliance and FAS)**

Various aspects of cross-compliance, as presented in the intervention logic (GAECs 1, 3, 4, 5, 6, 7, SMRs 1 and 10)<sup>114</sup>, are expected to improve water quality, or at least prevent further deterioration, depending on the Member States' implementation decisions (see ESQ 3). Indeed, cross-compliance standards contribute to the implementation of beneficial farm practices, leading to decrease in fertiliser and pesticide pollution (e.g. SMR 1, SMR 10, GAEC 3) and the reduction of runoff (e.g. GAECs 1, 4), leaching (e.g. GAECs 5, 6, 7) or erosion (e.g. GAECs 5, 7).

The Farm Advisory System (FAS) offers advice to farmers so that they better understand and meet certain EU rules (e.g. cross-compliance requirements). It may also cover other subjects (e.g. climate change mitigation and adaptation, biodiversity and protection of water). Some interviews in case-study Member States showed the positive influence of the FAS regarding water topics (e.g. heightened awareness among farmers about the nutrients issues in Austria; workshops, lectures and demonstrations providing information on cross-compliance requirements in Croatia). On the contrary, in Romania, the current absence of a clearly identified FAS is a barrier to awareness-raising on water issues and hinders the setting up of virtuous practices. (Alliance Environnement, 2017c).

#### **Pillar I instruments**

Effects of direct payments directed to water quality are difficult to assess. Indeed, decoupled direct payments are granted to farmers independently of their type of production decisions, if they respect specific EU rules (cross-compliance). As explained in ESQ 7, BPS guarantees a support to farm income which enables farmers to implement less profitable practices with beneficial effects on water (e.g. small diversified holdings or extensive grass-fed cattle rearing). However, this area-based support favours large holdings complying with GAEC and SMR, independently of their farming systems, water management choices or amount of inputs used. According to the FADN analysis, the direct payments also helped support specific sectors with high fertilisation expenses. This is, for instance, the case of maize producers in Alsace (FR) and Croatia and of wheat producers in Austria, Poland and Romania, for which the share of Pillar I payments over the Farm Net Value Added is significant.

Voluntary Coupled Support (VCS) can be used to maintain specific agricultural sectors, with beneficial effects on water quality. The maintenance of grain legumes and protein crops can lead to reduced quantities of fertilisers used. Coupled support granted to the livestock sectors can either be positive or negative on water quality. Indeed, increased livestock density can lead to higher nutrient pressure, whereas the maintenance of extensive grazing systems can positively impact water (Ecorys et al., 2016) if animal trampling along watercourses is avoided. VCS granted for fruits and vegetables can influence the management practices implemented by F&V producers, as it requires them to comply with GAEC and SMR<sup>115</sup>. This sector is indeed characterised as a significant user of pesticides and fertilisers.

The greening measures from Pillar I also delivers a positive contribution to improve water management, according to the effectiveness analysis (see ESQ 3). The maintenance of permanent grassland is beneficial for water protection and has proven to be effective for water management. However, the positive contribution of the measure depends on the implementation choices made by the Member States (e.g. national or regional ratio, share of designated ESPG), these choices not being subject to any needs assessment obligation (contrary to the RDP measures). The EU definition of permanent grassland<sup>116</sup> allows ploughing and reseeded, which increases the risk of runoff and erosion and

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<sup>114</sup> GAEC 1 requires the establishment of buffer strips along watercourses; GAEC 3 targets groundwater protection; GAEC 4 requires minimum soil cover; GAEC 5 aims at limiting erosion; GAEC 6 targets the maintenance of soil organic matter; GAEC 7 promotes the retention of landscape features; SMR 1 targets nitrates pollution; SMR 10 concerns the use of plant protection products.

<sup>115</sup> Historically, fruit and vegetables sectors do not benefit from direct payments entitlements and are therefore not subject to cross-compliance rules.

<sup>116</sup> The Court Judgement of 2 October 2014 in Case C-47/13 specifies: 'The definition of "permanent pasture" set out in Article 2(2)(c) of Commission Regulation (EC) No 1120/2009 [...] must be interpreted as covering agricultural land which is currently, and has been for five years or more, used to grow grass and other herbaceous forage, even though that land has been ploughed up and seeded with another variety of herbaceous forage other than that which was previously grown on it during that period.'

therefore of negative impact on water quality. However, the 'Omnibus' regulation authorises Member States to consider as permanent grassland land that has not been ploughed within a period of five years<sup>117</sup>, thereby enhancing the positive contribution of the measure to the objective of improved water management. However, this has also led to early ploughing of temporary grasslands to avoid their change into permanent grasslands, as stated by the stakeholders interviewed in Germany and France.

Under the EFA measure, some eligible EFAs (e.g. catch crops/green cover, buffer strips and hedgerows) have a high potential regarding water quality, as they contribute to the reduction of runoff, leaching and erosion. The ban on pesticides used on EFAs introduced in 2018 enhanced coherence with regard to the objective of reducing chemical pollution; however, it led to a decrease in the uptake of legume cultivation as catch/cover crops as EFAs (Alliance Environnement, 2017c).

Equivalence to the crop diversification measure introduced by the Member States have the potential to increase the positive contribution of the measure to the water protection objectives (Alliance Environnement, 2017c). However, the certification scheme implemented in France for single-crop maize growers can be detrimental to water, despite the equivalent practice which requires farmers to establish winter cover on their entire holding<sup>118</sup>. Moreover, it allows French farmers to continue maize monocropping, which results in higher abstraction and concentration of fertilisers/pesticides used, as underlined by the stakeholders interviewed.

## **Pillar II measures**

As mentioned in the effectiveness questions, a range of RDP measures has the potential to deliver a coherent contribution to water quality objectives<sup>119</sup>.

Measures and instruments promoting information, advisory services and training (M1, M2) could also be coherent when addressing water issues. They were implemented by specific Member States to raise farmers' awareness and help them to address water issues (e.g. in NL, M1.1 supports awareness raising on water-related issues in specific areas identified by the water boards; in Finland, M2.1 supports advisory services on the improvement of water management including pesticides and fertilisers). Moreover, in places where M1 and M2 are used to better implement cross-compliance or other measures targeting water, a synergistic contribution toward water objectives can be obtained (e.g. in Croatia M1.1 is compulsory for the beneficiaries of M10 AECM and M11 Organic farming; in Romania, specific advice to M10 and M11 beneficiaries is supported by M2.1, whereas M1.1 supports professional development training for M10). However, in some Member States, M1 and M2 were not or hardly used because of administrative burden (see ESQ 3), e.g. in North Rhine-Westphalia (DE) and Alsace (FR), where advice is promoted by other (traditional) ways (e.g. Chamber of Agriculture, Region, water agencies, private companies).

M4 Investments can work synergistically with cross-compliance requirements by allowing farmers to modernise their holdings and become compliant with standards (e.g. investments in manure storage equipment to comply with SMR 1). M4 Investments may also be used in synergy with M10 AECM/M15 Forest-environment-climate, by supporting non-productive investments in the equipment needed to undertake management practices agreed to as part of the contract, e.g. in Malta where M4.4 supports actions under AECM<sup>120</sup>. It should be noted that the use of artificial drainage, supported under M4 in the Netherlands and Poland, can have indirect negative effects on water quality by carrying pesticides and nitrates directly into surface water.

Regarding M10 AECM and M11 Organic farming, all case-study Member States' interviewees agreed on their relevance to tackle water issues. Indeed, AECMs cover various themes which can contribute to water protection (e.g. control of runoff waters (DE, FR, FI) and leaching (DE, HR, AT), implementation of soil cover (FI, FR), grassing of permanent crops (HR), implementation of green cover (RO)). M11 has

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<sup>117</sup> BG, DE, EL, ES, HR, IT, CY, LT and SK decided that a grassland is not considered permanent if ploughed within a period of five years.

<sup>118</sup> Outside NVZ, this cover is mostly chemically destroyed, which impacts water quality negatively.

<sup>119</sup> M1 and M2 on farmers' awareness and knowledge; investment measure M4; M8 and M15 measures regarding forests; M10 Agri-environmental measures; M11 Organic farming; compensation measure M12; cooperation measure M16; M19 LEADER projects.

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<https://eufunds.gov.mt/en/EU%20Funds%20Programmes/European%20Agricultural%20Fund/Documents/Measures/MIZURA%2010/AECM%20guidelines%20AECMs%201234%206a6b6c%20%20V%20%202.pdf>

the potential to promote environmentally friendly practices and reduce nutrient and chemical pressures on water.

Another lever of action towards preservation of water quality is the use of measures contributing to the preservation of natural land and/or compensation for farmers in sensitive areas (e.g. M12.1 contribution to the improvement of the water management in the Gallocanta lagoon in Aragon (ES)). However, the effective contribution of the measure to the objective of improved water management is low because of its limited implementation (see ESQ 1).

Afforestation improves water quality by limiting soil erosion and surface runoff thanks to improved soil structure and physical protection (*Catalogue of NWRM*, 2013-2015). Consequently, forestry measures (M8 and M15) have a potential positive impact on water quality preservation and regulation. M8.1 and M8.5 were mentioned by stakeholders as having a positive impact on water through their action on land occupation<sup>121</sup>. However, the effectiveness of M8 and M15 is reduced by their restricted uptake.

M13 Payments to ANCs globally contribute to maintaining extensive production systems in remote areas. A decrease in the use of fertilisers and pesticides among some farm types benefiting from M13 support was observed in ESQ 7, thereby confirming its indirect positive contribution to improved water management.

Finally, M16 Cooperation and M19 LEADER have, in theory, the potential for coherent contribution to water objectives. However, in the case studies not many examples of projects carried out under these measures were mentioned as targeting water (see ESQ 3).

### **5.12.3 COHERENCE OF CAP INSTRUMENTS AND MEASURES WITH THE SPECIFIC OBJECTIVE OF INCREASING EFFICIENCY IN WATER USE BY AGRICULTURE.**

#### **Horizontal Measures (cross-compliance and FAS)**

Within cross-compliance, GAEC 2 verifies that farmers have an authorisation for water abstraction for irrigation, and, in some Member States, the presence of a metering device (e.g. FR, PL). GAEC 6 for the maintenance of soil organic matter, and GAEC 7 for the retention of landscape features, can also play a role by improving water retention in soil and decrease water abstraction.

The Farm Advisory System can be implemented in a coherent way to favour water-use efficiency. For instance, FAS can provide training to farmers involved in AECM for water savings (e.g. in Aragon (ES)).

#### **Pillar I instruments**

Under the CMO regulation<sup>122</sup>, specific support can be granted for investments in efficient irrigation equipment. The case studies highlighted that, in most cases, requirements for improved efficiency of the irrigation system are established and minimum water savings required for the replacement of existing equipment. The CMO support thus contributes to the objective of increased efficiency in water use; however, this contribution mainly depends on implementation by Member States, as no specific provision is made in EU regulation.

As explained above, the direct payments are granted to farmers independently of their practices (including water-efficient use) as long as they respect the cross-compliance rules. The analysis carried out in ESQ 5 showed that farm types specialised in the production of highly irrigated crop types (i.e. cereals and notably maize, fruits and vegetables) can receive significant payments per hectare under Pillar I, depending on the Member State.

Under the greening payments, the crop diversification measure can contribute to reduce the overall amount of water used for irrigation. Indeed, it prevents farmers from growing an irrigated crop over their entire arable land. However, as stated previously, the certification scheme granted to maize growers in France does not contribute to this objective. The certification scheme is thus in conflict with the objective of reducing water used for irrigation, especially in France, where a significant area of maize is irrigated (around 761,300 ha according to the FADN).

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<sup>121</sup> M8.1 promotes afforestation, and M8.5 supports forest resilience.

<sup>122</sup> Regulation (EU) No 1308/2013.



## Pillar II measures

With regard to the sub-measure M4.1 for investments in agricultural holdings, Article 46 of Regulation (EU) No 1305/2013 provides specific conditions for the eligibility of investments related to irrigation (see box on Article 46 in the descriptive chapter). For example, the beneficiary must install water-metering devices. For investments to improve an existing irrigation system, the applicant must prove that the investment will lead to a minimum of 5% to 25% water savings (demonstrated *ex-ante*), which is theoretically coherent with water efficiency<sup>123</sup>. However, Member States are free to set the percentage required (e.g. in Austria, M4.1 supports structural investments on existing irrigation systems with required water saving of at least 10%). The evaluators were able to judge whether this was ambitious or not.

Nonetheless, Article 46 of Regulation (EU) No 1305/2013 includes derogations that allow Member States to support investments for expansion of the irrigated areas affecting waterbodies assessed as 'less than good' for quantity reasons. Conditions require that this investment be combined with investment in an existing irrigation system (assessed *ex-ante* as offering potential water savings) and that the investments ensure effective reduction in water use representing at least 50% of the potential water savings, throughout the entire irrigation system, made possible by the investment in the existing irrigation system. This was mentioned as not coherent with the objective of increased efficiency in water use by the stakeholders interviewed, because, in the case of expanded irrigated areas, an increased share of the water is actually consumed by the crops (which means lower returns to soil). Moreover, it is difficult to assess '*ex-ante*' water savings with certainty, and no common procedure has been set up at EU level for such assessment. In addition, during case-studies, some Managing Authorities reported issues related to the implementation of this Article that concerned its misinterpretation (Apulia (IT)), increase in administrative burden due to this Article (Aragon (ES) and Apulia (IT)) and the fact that farmers are bearing the cost of setting up metering devices (Aragon (ES) and PL) even if partly covered by the aid.

M10 AECM can also contribute positively to tackle water quantity issues by improving water retention capacity of the soil (e.g. M10.1.a. in Aragon (ES) which promotes stubble maintenance) or reducing abstraction (e.g. see the Romanian example in box in the sub-section below).

### 5.12.4 COHERENCE OF CAP INSTRUMENTS AND MEASURES WITH THE SPECIFIC OBJECTIVE OF CLIMATE CHANGE ADAPTATION AND MITIGATION OBJECTIVES RELATED TO WATER.

Water quality favours well-functioning ecosystems which are positive for climate change adaptation. Water-use efficiency is also key to climate change adaptation (especially in areas prone to water scarcity issues). Therefore, all coherences, synergies and conflicts highlighted in the two sections above are also relevant to climate change adaptation.

#### Specific CAP measures contributing to the objective of climate change adaptation and mitigation objectives related to water

Under a changing climate, water resources need to be appropriately managed to face not only potential excess and stress episodes (i.e. floods and droughts), but also long-term changes in their availability.

Various water-related CAP measures are coherent in this respect, such as cross-compliance rules (GAECs 1, 2, 4, 5, 6 and 7), Pillar I greening measures and Pillar II measures M4, M5<sup>124</sup>, M10 (AECM). Indeed, climate change adaptation and mitigation can be achieved by promoting practices that improve water retention in soils, i.e. permanent grasslands, use of soil cover, increasing soil organic matter, and maintenance of landscape features (grass strips, hedgerows, trees, etc.). In this way, synergies between CAP instruments and measures on climate change adaptation and mitigation exist, such as in Saxony-Anhalt (DE), where a series of CAP instruments and measures (GAEC 5, EFA options, M13, M4 and M17) work coherently and synergistically together toward the general objective of climate action (Alliance Environnement, 2017a).

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<sup>123</sup> Of course depending on the device to be modernised (already fairly efficient or not).

<sup>124</sup> Measure M5 specifically targets prevention of natural disasters and restoration after such events. In Poland, for instance, M5.1 is mainly oriented towards flood prevention, though uptake of the measure is low.



Measure M10 (AECM) can have beneficial effects on water and climate issues, as seen by the fact that specific Types of Operation supported clearly target climate-change issues related to water. Examples include M10.1 TO02 in Croatia promoting grass cover for permanent crops to reduce the loss of organic matter from soil and prevent the release of greenhouse gases in addition to preserving water quality and quantity, and M10.1 Milieu\_02 in France helping to maintain grassland in flood expansion areas and restore them after flood events. The Romanian pilot measure 'Adaptation to climate change' (see box below) under AECM is also coherent with the objective to adapt water management by farmers to climate change.

M8 and M15 measures for afforestation also contribute to water regulation, erosion reduction and carbon sequestration that have an effect on both adaptation and attenuation of climate change (Alliance Environnement 2017).

### **Box 13: M10 AECM - Pilot sub-measure for the promotion of drought-resistant crops in Southern Romania**

In Romania, M10 AECM 'package 5' targets climate change adaptation. It includes a pilot sub-measure aimed at promoting more drought-resistant cropping systems in 71 designated local authority areas (UATs) in southern Romania, where around 900,000 ha of arable land is considered most at risk from drought and desertification. The package encourages the use of more drought-resistant crops, varieties and hybrids, and it encourages management practices such as the diversification of crop rotation in order to spread the risk of crop damage due to lack of water and the use of minimum tillage techniques to improve soil moisture. Theoretically this measure has good potential to address climate change adaptation. However, the uptake of this innovative AECM has been very limited due to lack of information on and promotion of the measure.

Source: Alliance Environnement

The EU regulation also provides that a Farm Advisory System (FAS) may supply information on climate mitigation and adaptation to farmers.

### **Noticed inconsistencies with the specific objective of climate change adaptation and mitigation**

Irrigation is energy-demanding, and electricity consumption varies depending on various aspects (e.g. depth of pumping, distance to source, irrigation system, crop water needs, etc.). To be coherent with climate change objectives, irrigation support granted under M4 or the CMO regulation should exclude highly GHG-emitting irrigation systems in favour of low GHG-emitting ones (e.g. irrigation by gravity, water pumps using renewable energy sources). No case-study Member States have set specific criteria to do so.

Another example concerns VCS support to the fruit & vegetables, cotton and rice sectors in Andalucía (ES), which led to overexploitation of water resources in the region (Alliance Environnement, 2018).

An example of conflict between CAP measures was noticed in Hungary, where the support to areas drained for cultivation leads to the increase of flood risks in other parts of the Member State, whereas M10 operation promotes management practices to improve water retention in soil and avoids flood risks (Alliance Environnement, 2017a).

## **5.12.5 COHERENCE OF CAP INSTRUMENTS AND MEASURES WITH THE PROVISION OF PUBLIC GOODS IN RELATION TO WATER**

As explained in the method above, the provision of water-related public goods mainly depends on the sustainability of its quantitative and qualitative management. Therefore, all the synergies and conflicts highlighted in the previous sections are also relevant to the analysis of the CAP coherence with the provision of water as a public good.

Another key element for the provision of water as a public good not mentioned in the previous sections is the maintenance of healthy ecosystems. In return, ecosystems can provide services which contribute to the already mentioned objectives of water quality and quantity, as well as climate change adaptation and mitigation. A non-exhaustive list of ecosystem services is provided below:

- mitigating/preventing floods by the maintenance of flood expansion areas and landscape features (grass strips, hedgerows, etc.);
- limiting erosion using vegetation covers, especially on riverbanks (grass strips, hedgerows, etc.);

- providing habitats for beneficial insects which could help fight crop pests and reduce pesticide use;
- improving the filtering capacity of ecosystems (wetlands, forests, natural grasslands, etc.) to purify water.

### **Specific CAP instruments and measures contributing to the provision of water as a public good**

Any CAP instrument and measure preventing alteration of water resources by agricultural pressures is considered to enhance the provision of water as a public good in the long run. This is particularly true when considering the costs associated with the depollution of water, as a consequence of agricultural pollution (see box below).

#### **Box 14 : Cost of water depollution from agricultural sources**

Water reuse, which is key in the context of increased water scarcity, is currently hindered by the costs associated with water treatment to remove pollutants (including pollutants from agricultural sources). These costs are considered to be much higher than the costs related to water abstraction. Indeed, European wastewater treatment plants (WWTP) need constant upgrades to reach the required thresholds in terms of water quality. Moreover, wastewater is not distributed through the same network as freshwater; it needs a parallel distribution network, which necessitates substantial costs.

In Spain, the initial investment costs for water treatment are reported to vary between €5/m<sup>3</sup> and €736/m<sup>3</sup> produced per day, whereas operational and maintenance costs were estimated to vary between €0.04/m<sup>3</sup> and €0.35-0.45/m<sup>3</sup> produced per day.

In Greece, in the WWTP of Psytaleia, the water treated could cost around €0.40/m<sup>3</sup>, whereas the cost for irrigation water is estimated between €0.02 and €0.70/m<sup>3</sup>. However, self-abstraction from groundwater pumping is estimated to be even cheaper, between €0.02 and €0.03/m<sup>3</sup>. Considering all costs necessary for wastewater reuse in Greece, infrastructures represent the most expensive budget (pipes, tanks, irrigation), whereas upgrading corresponds to roughly 5% of the total cost.

In Italy, average costs of wastewater purification were estimated to vary between €0.083 and €0.48/m<sup>3</sup> of water treated, whereas costs of abstraction from waterbodies were evaluated between €0.015 and €0.2/m<sup>3</sup>. Moreover, costs differ significantly between northern and southern Italy, mainly due to climate conditions (European Commission, 2016).

In France, overall wastewater collection and treatment were estimated roughly to reach €11.1 billion in 2009, with more than half of the costs dedicated to operation and maintenance. Costs for nitrates and pesticides removal were estimated to reach €70/kg and 60,000/kg respectively. The overall cost of removing these components from water was evaluated at €54 billion/year, whereas the overall cost to purify groundwater could exceed €522 billion (Commissariat Général au Développement Durable, 2011).

Thus, from an economic perspective, wastewater reuse is a worthwhile solution in areas where the costs of abstraction are high. In coastal areas and islands of the EU, wastewater reuse is presented as a more cost-efficient solution than desalination, which reaches €0.3 to €0.7/m<sup>3</sup>.

Source: literature review

RDP Forest measures (M8<sup>125</sup> and M15) could significantly contribute to the production of public goods (Alliance Environnement 2017) as forests play a role in the reduction of erosion, prevention and mitigation of floods and water purification. Though, as previously mentioned, the effective contribution of the measures was limited by their restricted coverage/uptake.

Support to Organic Farming (M11) strengthens the functionality of agro-ecosystems (e.g. pollinisation, biological pest controls, etc.). Some M10 AECM can also contribute to improve the effective functioning of ecosystems (e.g. in North Rhine-Westphalia (DE), where M10.1.3 supports the implementation of flower strips providing feed and reproduction area for insects which are natural enemies of pest insects<sup>126</sup>

As already mentioned in ESQ 11, the sustainable management of natural resources (including water) in agriculture also depends on effective advisory services. This was confirmed in a recent study showing that the adoption of specific sustainable practices is higher when farmers have sufficient knowledge and skills related to these practices (Dessart, Barreiro-Hurlé and van Bavel, 2019).

<sup>125</sup> Especially measures M8.1 support for afforestation, M8.2 support for agroforestry and M8.4 support for restoring forest areas.

<sup>126</sup> Land use changes, intensive farming, pesticide use, invasive species, pathogens and climate change were identified as causes for the decline of bees and butterflies (IPBES, 2016). However, data are insufficient to estimate the direct impact of pesticides on insect populations.

## Noticed inconsistency with the provision of water as a public good

In the Netherlands, several CAP measures promote river bank restoration, which favours ecosystem services. However, the positive contribution of the measures is hindered by the fact that submerged areas are not eligible for BPS (restoration of banks would induce a reduction of the land eligible for direct payments) (see box below).

### Box 15: the Dutch example of the restoration of nature-friendly river banks

The restoration of banks with the objective of re-profiling them as flatter slopes helps reduce water velocity and favour vegetation installation. This measure can have beneficial effects on diverse topics (e.g. preventing floods, increasing biodiversity, limiting erosion). In the Netherlands, measures M4.4.2 and M10.1.5 could support bank restoration into more nature-friendly, broad and gently sloping banks. However, water-management authorities mentioned that farmers were reluctant to uptake those measures because submerged areas are not eligible under basic payments. Consequently, restoration of banks leads to reduction of the eligible land.

Source: Alliance Environnement

## 5.12.6 REPLY TO THE ESQ 12

Based on the findings from the internal coherence analysis carried out, the table below synthesises the relationship (e.g. synergy, competition, contradiction, etc.) between the CAP instruments and measures and the water-related objectives.

**Table 70: Outline matrix for assessing coherence of CAP instruments and measures with the water-related specific objectives for 'sustainable management of natural resources and climate action'**

CAP measures and instruments	Sustainable Management of Natural Resources and Climate Action			
	Improve water (qualitative) management, including fertiliser and pesticide management	Increase efficiency in water use by agriculture	Pursue climate change mitigation and adaptation	Provide public goods
<b>Horizontal measures</b>				
Cross-compliance	+1	+1	+1	+1
Farm advisory systems	+1	+1	+1	+1
<b>Pillar II measures</b>				
Knowledge transfer and capacity-building measures (M1, M2 and M16)	+1	+1	+1	+1
Investment measures (M4)	M	M	M	M
Forestry measures (M8, M15)	+1	+1	+1	+1
Land management measures (M10, M12 and M15)	+1	+1	+1	+1
Organic farming (M11)	+1	+1	+1	+1
Areas facing natural constraints (M13)	0	0	0	0
LEADER (M19)	N/A	N/A	N/A	N/A
<b>Pillar I measures</b>				
Basic payments	0	0	0	0
Greening – Crop diversification	+1	+1	+1	+1
Greening – Ecological Focus Areas (EFAs)	+1	+1	+1	+1
Greening – permanent grassland	M	M	M	M
Voluntary Coupled Support (VCS)	M	M	M	M
CMO sector-specific support	N/A	M	M	M

Source: Alliance Environnement based on EU legislation, literature review and case-study reports

### Legend

- Red (-1) = contradictions or competition;
- Blue (M) = mixed, depends on Management Authorities' implementation choices;
- Yellow (0) = neutrality, or no particular association; and
- Green (+1) = a complementary or synergistic relationship.

Regarding the objective of **improving water management (in terms of quality)**, the CAP instruments and measures have, in general, delivered a partial coherent contribution. Incoherence was identified in choices made by some Member States that are not ambitious enough on water issues (e.g. small national ratio of permanent grassland, no regulation on input use on permanent grassland, allowance of the use of pesticides to destroy winter crops). Notably, the definition of permanent grassland was mentioned by stakeholders interviewed, as it led to knock-on effects on the ploughing of grassland to avoid their classification as permanent. Also, the certification scheme granted to maize growers in France is inconsistent with the objective of reducing the pesticides used<sup>127</sup> and the water abstracted for irrigation. The delivery of coupled support to livestock can increase manure storage issues, but also contribute to extend grasslands areas, with positive effects on water protection. VCS granted to fruits and vegetables can influence the management practices implemented by F&V producers, as it requires them to comply with GAEC and SMR<sup>128</sup>. Synergies were identified, such as the provision of tailored advices (FAS, M1, M2) to better implement other water-related measures (M10, M11, M12) beneficial for the reduction of pesticides and fertilisers used. It should be noted that the use of artificial drainage, supported under M4 in the Netherlands and Poland, can have indirect negative effects on water quality by carrying pesticides and nitrates directly into surface water.

As regards the objective of **increasing efficiency in water use**, specific CAP instruments and measures contribute to increase the water retention in soils (M4, M8, M10, M11, M15), reducing the need for water abstraction. However, inconstancy arises from the implementation of M4 Investment support for irrigation systems. Indeed, the creation and expansion of irrigation systems can be supported in areas where the quantitative status of waterbodies is less than good. Also, sector-specific support granted under the CMO regulation can be used to support investment in efficient irrigation systems<sup>129</sup>. However, its contribution to the objective of increasing efficiency in water use will vary according to the Member State implementation. Furthermore, direct payments are granted to farmers independently of their practices (including water-efficient use) as long as they respect the cross-compliance rules. The analysis showed that farm types specialised in the production of highly irrigated crop types (i.e. cereals and notably maize, fruits and vegetables) can receive significant payments per hectare under Pillar I, depending on the Member State.

As regards the objective of **climate change mitigation and adaptation** (in relation to water), the CAP instruments and measures delivered a coherent contribution by promoting practices improving water retention in soils, i.e. permanent grasslands, use of soil cover, increased soil organic matter, maintenance of landscape feature (grass strips, hedgerows, trees, etc.). M10 was notably mentioned in Romania as it was specifically implemented to address climate change adaptation by favouring the introduction of alternative drought-resistant crops. M8 and M15 measures for afforestation could also play a significant role in water regulation, erosion reduction and carbon sequestration with positive effects on adaptation to and attenuation of climate change, but their limited implementation hindered these benefits. However, in specific cases, inconsistencies were noticed by stakeholders with regard to CAP support granted to water irrigation systems inducing significant GHG emissions, or measures inducing increased flood risks in neighbouring areas (HU).

The overall coherence of the CAP measures and instruments with the specific objectives of improving water (quality) management, increasing water-use efficiency and enabling climate change mitigation and adaptation ensures partly coherent contribution of the CAP framework with the **objective of providing water-related public goods**. However, all the inconsistencies raised previously remain true, i.e. basic payments granted independently of water-relating pressures, mixed effects of VCS, definition of permanent grassland, M4 investments and CMO sector-specific support to irrigation systems, etc. The potential contribution of M1 and M2 information and advisory measures is deemed as insufficient for the adoption of specific sustainable practices necessary for the proper functioning of ecosystems, considering the low uptake of these measures. Furthermore, stakeholders interviewed in the Netherlands underlined the potential conflict between land management measures (e.g. GAEC Buffer Strips, M10 AEEM on Riparian Bank Restoration) and direct payments when it comes to reducing the area eligible for payment entitlements.

<sup>127</sup> Notably in the Rhine River Basin, where groundwater quality is affected by the phytosanitary products used for maize production.

<sup>128</sup> Historically, fruit and vegetables sectors do not benefit from direct payments entitlements and are therefore not subject to cross-compliance rules.

<sup>129</sup> Under less stringent rules than Article 46 of Regulation (EU) No 1305/2013 (EAFRD) as seen in ESQs 1 and 2.

### **5.13 COHERENCE– ESQ 13: TO WHAT EXTENT HAS THE ENTIRE SET OF RELEVANT CAP INSTRUMENTS AND MEASURES DEDICATED TO THE ENVIRONMENT/CLIMATE DELIVERED A COHERENT AND COMPLEMENTARY CONTRIBUTION TO ACHIEVING THE WATER-RELATED OBJECTIVE OF ENVIRONMENTAL/CLIMATE LEGISLATION AND STRATEGIES, IN PARTICULAR THE WATER FRAMEWORK DIRECTIVE, NITRATES DIRECTIVE AND SUSTAINABLE USE OF PESTICIDES DIRECTIVE, NATURE LEGISLATION AND THE BIODIVERSITY STRATEGY?**

*In answering this question, particular attention should be paid to River Basin Management Plans and their Programmes of Measures.*

#### **5.13.1 UNDERSTANDING OF THE QUESTION AND METHODOLOGICAL APPROACH**

External coherence is defined as the extent to which a policy/measure does not contradict other policies/measures with similar objectives. Whereas the previous chapter on ESQ 12 deals with internal coherence, ESQ 13 focuses on the evaluation of external coherence. This chapter assesses coherence of water-oriented CAP instruments and measures with other environmental/climate EU policies contributing to water-focused objectives, notably the Water Framework Directive, Nitrates Directive, Sustainable Use of Pesticides Directive, Nature legislation (Birds Directive and Habitat Directive) and EU Biodiversity Strategy to 2020.

Water is addressed by diverse sectoral European policies, whether they concern climate, environment or agriculture. The CAP can contribute to the achievement of other policies with the objective of covering climate change and sustainable management of natural resources. Notably, it is designed to enable the farm sector to change its practices in order to mitigate climate change and adapt to it. The core issues concern water quantity, including flood and drought prevention (e.g. choice of less water-demanding crops, improved water retention in soil, creation of flood retention basins, etc.). The CAP also targets environmental objectives and can contribute to the reduction of substances impacting water quality (nutrients, chemical and soil sediments) and quantity (e.g. sustainable use of water, release of hydromorphological pressure, etc.) and generally contribute to the improvement of ecological status.

The relevant CAP instruments and measures addressing the sustainable management of natural resources and climate action, as well as the EU water legislative framework, have been described in the descriptive chapter of the report. CAP instruments and measures are supposed to be coherent with other EU water and environmental policies. It must be kept in mind that water-related actions promoted by the CAP and their coherence with other policies with the same objective should not be undermined by actions incentivised through the CAP but for other (e.g. economic, territorial) objectives.

To answer this question, the first step consisted in conducting a theoretical analysis of the coherence between specific objectives of the relevant CAP instruments and measures and the objectives of other EU policies related to water. For this purpose, recommended or compulsory water-oriented measures were identified for each policy:

- River Basin Management Plans (RBMPs) and Programme of Measures (PoMs) from the WFD;
- Pricing policies from the WFD;
- Action Programmes from the Nitrates Directive;
- National Action Programmes from the Sustainable Use of Pesticides Directive;
- Natura 2000 areas resulting from the Birds Directive and Habitats Directive;
- Biodiversity Strategy to 2020 (target 3: enhance CAP direct payments to reward environmentally friendly actions);

This question also considers the extent to which other EU policy can affect the agricultural sector and lead to increased pressures on waterbodies (e.g. GATT Dillon, Blair House Agreement)

The analysis was then rounded out using the output from ESQ 1 on Member States' implementation choices and from ESQ 3 on the effects of relevant CAP instruments and measures and case studies, to assess whether a coherent contribution was achieved in practice.

Finally, the conclusions are presented in a colour-coded screening matrix representing the potential synergetic, neutral or conflictual relations between CAP instruments and measures and each EU policy.

### 5.13.2 CONTRIBUTION OF THE CAP INSTRUMENTS AND MEASURES TO THE WATER FRAMEWORK DIRECTIVE

Coherence has been examined on all aspects related to water and agriculture in the WFD. The analysis considered the objectives of the Directive, as well as the content of the Programmes of Measures required under the RBMP, to identify the CAP instruments and measures which could contribute to the WFD objectives.

#### 5.13.2.1 Coherence with the WFD objectives

The WFD aims at no deterioration and the achievement of good status of all surface and ground waterbodies in the EU. Various aspects of the CAP contribute to the achievement of this objective, e.g. cross-compliance, greening measures and RDP measures (see effectiveness analysis). The institutional process for the implementation decisions of the 2014-2020 CAP framework has fostered exchanges between relevant stakeholders (e.g. Ministry of Agriculture, water authorities and environmental NGOs).

Participation by water-related stakeholders is necessary to guarantee the integration of the WFD objectives into the CAP. However, in some case-study Member States, stakeholders and authorities related to water were more actively involved (e.g. FR, IT, NL, FI), as opposed to other case-study Member States where they had less influence (e.g. DE, HR, RO), according to the stakeholders interviewed. As mentioned in ESQ 11, some Member States explicitly designed and implemented their RDP to address the issues identified in their RBMPs (e.g. NL, PL, SI, FI).

However, inconsistencies arise from the implementation of Article 46 of Regulation (EU) No 1305/2013 setting specific conditions for investments related to irrigation. Indeed, M4 investments can be used to fund the creation and expansion of irrigation systems in areas where the quantitative status of waterbodies is less than good, which could lead to increased water consumption. Other issues concern the definition of permanent grassland, which sometimes leads to the ploughing of grassland to avoid its classification as permanent. Also, the certification scheme granted to maize growers in France is inconsistent with the objective of reducing the amounts of pesticides used<sup>130</sup> and of water abstracted for irrigation. Furthermore, the delivery of coupled support to livestock can exacerbate manure storage issues but at the same time help extend grasslands areas, with positive effects on water protection (see ESQ 12). However, direct payments also helped support specific sectors with high fertilisation and pesticides expenses, as demonstrated by the FADN analysis (see ESQ 4). This is, for instance, the case of maize producers in Alsace (FR) and Croatia and of wheat producers in Austria, Poland and Romania, for which the share of Pillar I payments over the Farm Net Value Added is significant.

#### 5.13.2.2 Coherence with the Programme of Measures

The PoMs encompass basic measures which include mandatory and optional supplementary measures. The basic measures are subdivided into measures to implement EU water-related directives and other basic measures (cost recovery for water services, measures to meet the requirements on drinking water abstraction, etc.). This section examines the coherence of the CAP instruments and measures with the basic measures.

**The Nitrates Directive (91/676/EEC):** The analysis of the contribution of the CAP to the Nitrates Directive is assessed in the next section (5.13.4).

**The Plant Protection Products Directive (91/414/EEC) repealed by Regulation (EC) No 1107/2009:** This Regulation concerns the marketing authorisation as well as the use and control of plant-protection products within the EU. Its main objectives are addressed by cross-compliance rules under SMR 10 (see box below). As an example, the obligation to 'keep records of purchase, use and disposal of phytosanitary products' is checked under SMR 10 in 6 out of 10 case-study Member States (DE, ES, HR, IT, AT, RO). Advice, as well as technical and guidance documentation, can be provided via FAS or the use of measures M1 Knowledge transfer and M2 Advisory services. For instance, in Alsace (FR) M1.1 provides for support to 'competitive and environmentally friendly agriculture, and a

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<sup>130</sup> Notably in the Rhine River Basin, where groundwater quality is affected by the phytosanitary products used for maize production.



sustainable management of forestry, including the phytosanitary products use'. Concerning the FAS, it necessarily provides information about the use of plant-protection products.

#### **Box 16: Role of SMR 10 for the implementation of the Plant Protection Products Regulation**

Within cross-compliance, SMR 10 was designed to set requirements for the use of plant-protection products. This SMR refers to the Plant Protection Products Regulation (EC) No 1107/2009 and by extension to the Sustainable Use of Pesticides Directive (SUPD) as mentioned in Article 55 of the regulation concerning the use of plant-protection products (PPP). Control points within SMR 10 concerns the purchase, use, storage and disposal of PPP on farms (e.g. sprayer check report, respect of the timing for entering greenhouses after PPP application, valid certificate for the use of PPP, etc.).

Source: Alliance Environnement

**The Birds Directive (79/409/EEC) amended by Directive 2009/147/EC and the Habitats Directive (92/43/EEC):** The Birds Directive and the Habitats Directive objectives can be addressed by similar water-relevant CAP instruments and measures, mainly GAEC 7 and greening Measures (EFAs and permanent grassland), as well as measures from Pillar II which influence land use and/or limit pollutant transfer to water. Objectives of the two Directives are specifically oriented towards biodiversity and environment and not directly focused on water, though water-dependent ecosystems could be concerned (e.g. peatbogs, wetlands, river banks). In Apulia (IT), the sub-measure M4.4 promotes investments for buffer zones, hedges and constructed wetlands, etc. In Austria, M7.6 supports the preservation, improvement and restoration of valuable nature conservation areas. In addition, M8.1 offers payments for afforestation and maintenance of non-agricultural land (e.g. in Apulia (IT), AT, PL). Under M10, AECMs oriented towards the management of wetland exist in Finland and France. The M11 support for organic farming promotes environmentally favourable farming. In Austria, M12 can support restoration, preservation and improvement of agricultural ecosystems and the implementation of the Natura 2000 commitment. M13 compensation payments to areas facing natural constraints, as well as VCS support for livestock, can promote the maintenance of extensive farming activities in some geographical areas and maintain a certain biotope and its related biodiversity (e.g. VCS support livestock in FR and ES (Ecorys et al., 2016)). However, regarding VCS, support to livestock can also be detrimental to water in cases in which it leads to an increase of nutrients pressure.

**The Integrated Pollution Prevention Control Directive (96/61/EC) repealed by Directive 2010/75/EU:** The provisions to avoid substances which contribute to eutrophication and the measures targeting intensive poultry and pig rearing can be supported under cross-compliance requirements and RDP M4 on investments. For instance, in Alsace (FR), investments to upgrade livestock buildings are supported under M4.1. Some AECMs can contribute to the objectives of reusing and disposing wastes, such as the recycling and balanced use of nutrients (FI) and the incorporation of slurry and organic matter into the soil (FI, IT).

**The Drinking Water Directive (80/778/EEC) repealed by Directive (98/83/EC):** The protection of water resources intended for human consumption can be addressed mainly through the cross-compliance requirements. Direct or indirect discharge of any prohibited substance in water is checked under GAEC 3, which aims at protecting groundwater against pollution. GAEC 1 on buffer strips, GAEC 4 for minimum soil cover and SMR 10 on PPP contribute to prevent nutrient and other potentially dangerous substances from ending up in water. M7.2 from Pillar II supports modernisation of public drinking water/or public wastewater networks, as is the case in Romania. In general, the conversion to organic farming, in which the use of artificial fertilisers, herbicides and pesticides is forbidden, can alleviate agricultural pressure on drinking water and reduce the associated depollution costs.

**Other basic measures and supplementary measures from the Programme of Measures:** 'Other basic measures' refer to the implementation of recovery of cost for water services based on Article 9 of the WFD requiring Member States to implement water-pricing policies accordingly. While pricing policies are not within the scope of the CAP, in various Member States water-pricing policies do not provide incentive for farmers to use water efficiently (European Commission, 2017). 'Other basic measures' also include measures to promote efficient and sustainable water use, measures to safeguard water quality and reduce the level of purification treatment, and controls over the abstraction of water, etc. Regulation (EU) No 1305/2013 set provisions for Member States to implement the M12 Natura 2000 and WFD measures, with the objective of compensating beneficiaries for additional costs of or income foregone from the implementation of these 'other basic measures', when these measures impose major

changes in type of land use and/or major restrictions in farming practices resulting in a significant loss of income (Article 30(4)(d)). However, because few measures of this type were actually implemented in the case-study Member States, M12 was used to a limited extent. According to the CMEF indicators, only 5% of EU farms benefited from this measure in 2015-2017. Only in Aragon (ES) does the RDP provide payments for agricultural areas included in RBMPs under M12.3.

As regard supplementary measures of the Programme of Measures, they are potential levers that River Basin Managing Authorities can use to achieve the WFD objectives. Supplementary measures can be supported by the RDP. For instance, support for demonstration projects is granted through M1.2 in Austria, Croatia and Finland, or M4.4 support to restore vegetation along waterways in the Netherlands.

### **5.13.3 CONTRIBUTION OF THE CAP INSTRUMENTS AND MEASURES TO THE NITRATES DIRECTIVE**

To enforce application of the Nitrates Directive by farmers, promotion, training and information on good agricultural practices can be supported by CAP instruments and measures designed to promote advisory services (FAS, M1 and M2). The FAS intend to help farmers to understand cross-compliance (which induces provision for the implementation of the codes of good agricultural practices), raise farmers' awareness on environmental issues and promote good practices. Case-study experts in Aragon (ES) reported that some measures of the RDP can contribute positively to the objectives of the 'Action Programme on Vulnerable Zones', mentioning M1, M2 and some actions related to slurry management supported by M16 Cooperation.

SMR 1 relates to Articles 4 and 5 of the Nitrates Directive<sup>131</sup>, which requires Member States to establish a programme of actions which is compulsory in Nitrate Vulnerable Zones (NVZ) and whose action points must be verified under cross-compliance. As demonstrated in ESQ 1, SMR 1 has been implemented by case-study Member States in a way that effectively protects water from nutrient pollution. It appears from ESQ 3 that SMR 1 requirements are stringent, judging by the relative high level of non-conformity among case-study Member States (from 3% in AT to 26% in FR). This was confirmed by the stakeholders interviewed.

#### **Box 17: Role of SMR 1 in the implementation of the Nitrates Directive**

Within cross-compliance, SMR 1 was specially designed to ensure compliance with the Nitrates Directive (91/676 /EEC) and aims at protecting water against pollution caused by nitrates from agricultural sources. SMR 1 consists of requirements that must be met by farmers located in NVZs. The control points under SMR 1 are based on the Action Programme established by the Member States. The main items verified are the spreading dates of fertilisers, their application on steep slopes, the spreading distances from water points, and the adequate storage capacities and suitable collection of livestock manure or other soiled water. Nitrogen fertilisation balance is also verified by Member States; however, soil analysis is carried out in North Rhine-Westphalia (DE) only. Three Member States also verify soil coverage during winter or along watercourses.

Source: Alliance Environnement

M10 AECM and M4 Investments can also help farmers to comply with these requirements, within one year after their implementation. Livestock manure storage distance from water is also checked under GAEC 3 in some case-study Member States (DE, FR, PL and FI). In France, the national authorities reported that cross-compliance was an important tool for facilitating implementation of the Nitrates Directive. Outside the Nitrates Vulnerable Zone, Codes of Good Agricultural Practices can be implemented by farmers on a voluntary basis and supported by Pillar II measures. The mandatory soil cover required by the Nitrates Directive is checked under SMR 1; however, its presence is also verified under GAEC 4 for minimum soil cover. In some case-study Member States, M10 (AECM) is used to prevent leaching and runoff of water (DE, FR, HR, AT and FI), thereby providing additional contribution to the achievement of the Nitrates Directive objectives.

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<sup>131</sup> Council Directive 91/676/EEC concerning the protection of waters against pollution caused by Nitrates from agricultural sources.

#### **5.13.4 CONTRIBUTION OF THE CAP INSTRUMENTS AND MEASURES TO THE SUSTAINABLE USE OF PESTICIDES DIRECTIVE (SUPD)**

The Sustainable Use of Pesticides Directive seeks to reduce the impact associated with pesticides use, notably by encouraging the use of Integrated Pest Management and alternative practices, such as non-chemical alternatives to pesticides.

Objectives of the SUPD can mainly be addressed by advisory and knowledge transfer instruments and measures (FAS, M1, M2). For instance, under M2.3 Spain and Poland supported the improvement of training, professional qualification and specialisation of the advisers in places where information on sustainable pesticide use is provided. However, as mentioned previously in this report (ESQ 3 and ESQ 12), M1 and M2 effectiveness differed among Member States.

Support for conversion to and maintenance of organic farming under M11, which concerned 9% of the EU UAA between 2015 and 2017, is key to the reduction of synthetic pesticides. Some actions under M10 were also oriented towards sustainable use of pesticides (e.g. biological control in HR and abandonment of pesticide use in vineyards and for hops in AT). Other RDP support could be used to address SUPD, such as in Alsace (FR) where EAFRD payments are used as part of the Ecophyto plan to finance EEIG focused on diffuse pollution under M16 Cooperation.

The SUPD requirements are not included in cross-compliance. However, in some Member States (North Rhine-Westphalia (DE), Aragon (ES), HR, AT, RO, FI) SMR 10 provided for restrictions on the use of pesticides in sensitive areas (near surface or coastal water or other protected areas) and checks on pesticide-application equipment, which is coherent with the SUPD requirements.

#### **5.13.5 CONTRIBUTION OF THE CAP INSTRUMENTS AND MEASURES TO THE BIODIVERSITY STRATEGY**

The EU Biodiversity Strategy was introduced in 2010 and aims at stopping global biodiversity loss by 2020. It addresses water-related aspects that could be supported through CAP instrument and measures. In particular, Action 8 under Target 3 of the Biodiversity Strategy is clearly oriented toward environmental concerns in the CAP.

Sub-action 8.a focuses on direct payments to reward sustainable practices improving environmental public goods. This was achieved through the implementation of the greening payments, which ensure that 30% of the direct payments are conditional to practices beneficial for the environment (i.e. crop diversification, EFA, maintenance of permanent grassland). However, as detailed in ESQ 12, BPS are granted to farmers independently of their farming systems, agricultural practices and corresponding pressures on water, insofar as they comply with GAEC and SMR. Sub-action 8.b specifically addresses the objectives of the WFD and considers the use of cross-compliance to target the objectives of the WFD. The contribution of cross-compliance to the objectives of the WFD was examined in the sections above. No example of coherence/incoherence between CAP and Biodiversity Strategy was mentioned during case-study interviews.

#### **5.13.6 OTHER EU LEGISLATION AFFECTING AGRICULTURAL PRACTICES AND CORRESPONDING PRESSURES ON WATER**

Some agreements between the EU and other partners in the world can have an indirect effect on water.

This is for example the case of the application of the GATT Dillon Round in 1962, during which the European Commission dropped its import tariffs on oilseeds, oilseed products and non-grain feed ingredients, allowing these productions to enter in the EU duty free. A second example is the 'Blair House Agreement', which limited EU support for oilseed production to 5,482 million hectares<sup>132</sup>. Both agreements led to the increase of imports of animal feed products, which resulted in the concentration of some animal husbandry farms around big ports and led to a specialisation of regions that led to

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<sup>132</sup> The agreement allows for modification of this maximum supported area, further to enlargement of the Union. While the original maximum base area was set at 5.128 million hectares, it was increased to cover the EU15 further to the 1995 enlargement. However, no amendment of the agreement was negotiated to reflect subsequent enlargements.

structural pollution of waters. Hence, some other factors outside the CAP itself such as trade agreements can be in contradiction with the water objectives, even if indirect.

### 5.13.7 REPLY TO THE ESQ 13

The table below summarises the coherence between CAP instruments/measures as regard the water-related Directives and Strategy.

**Table 71: Matrix of the theoretical potential coherence between CAP instruments and key water and environmental policies and strategies**

CAP measures and instruments	Other EU Policies				
	WFD	Nitrates Directive	SUPD	Nature legislation	Biodiversity Strategy
<b>Horizontal measures</b>					
Cross-compliance	+1	+1	0	+1	+1
Farm advisory systems	+1	+1	0	0	0
<b>Pillar II measures</b>					
Knowledge transfer and capacity-building measures (M1, M2 and M16)	+1	+1	+1	0	0
Investment measures (M4 and M8)	M	+1	0	+1	+1
Land management measures (M10, M12 and M15)	+1	+1	+1	+1	+1
Organic farming (M11)	+1	+1	+1	+1	+1
Areas facing natural constraints (M13)	+1	0	0	+1	+1
LEADER (M19)	+1	0	0	+1	+1
Basic services and natural disasters (M5, M7)	+1	0	0	+1	+1
<b>Pillar I measures</b>					
Sector-specific support under CMO	+1	0	0	0	0
Basic payments	0	0	0	0	0
Greening – Crop diversification	+1	+1	0	0	+1
Greening – Ecological Focus Areas (EFAs)	+1	+1	0	+1	+1
Greening – permanent grassland	M	+1	0	+1	+1
Voluntary Coupled Support (VCS)	M	0	0	0	0
<b>Other non-CAP policies</b>					
Other non-water-targeted measures outside CAP (e.g. 0-tariff import)	-1	-1	0	0	0

Source: Alliance Environnement based on EU legislation, literature review and case-study reports

#### Legend

- Red (-1) = contradiction or competition;
- Blue (M) =mixed, depends on Managing authorities implementation choices
- Yellow (0) = neutrality, or no particular association; and
- Green (+1) = a complementary or synergistic relationship.

The evaluated CAP instruments and measures have delivered an overall coherent contribution to achieving the objectives of the **Water Framework Directive**. Cross-compliance, the greening payments and RDP measures can contribute to alleviating agricultural pressures on waterbodies, depending on Member States' implementation choices and beneficiaries' uptake. In particular, the CAP instruments and measures play a significant role in the implementation of the PoMs' basic and supplementary measures. However, M12 WFD support could have been more used to ensure coherent contribution of the CAP to the WFD. According to the CMEF indicators, only 5% of EU farms benefited from this measure in 2015-2017 assessment period. Furthermore, inconsistencies arise from the implementation of Article 46 of Regulation (EU) No 1305/2013 setting specific conditions for investments related to irrigation. M4 Investments can be used to fund the creation and expansion of irrigation systems in areas where the quantitative status of waterbodies is less than good, thereby possibly leading to increased water consumption. Other issues include the definition of permanent grassland, the certification scheme granted to maize growers in France and the delivery of coupled support to specific sectors with mixed effects on water depending on their agricultural practices. Also, the delivery of direct

payments to specific sectors with mixed effects on water depending on their agricultural practices prevents full coherence of the CAP with EU water policy.

Regarding coherence with the **Nitrates Directive**, contribution by the CAP instruments and measures is significant; indeed, stakeholders interviewed reported that SMR 1 under cross-compliance significantly contributed to the enforcement of the Action Programmes established by Member-States in Nitrates Vulnerable Zones. The requirements set under SMR 1 were perceived as very stringent by the farmers, according to the interviews. Moreover, M10 AECM and M4 Investments were used to help farmers comply with these requirements, within one year after their implementation.

Support for conversion to and maintenance of organic farming under M11 is key to the reduction of synthetic pesticides and significantly contributed to the achievement of **the Sustainable Use of Pesticides Directive**, notably by encouraging the use of Integrated Pest Management and alternative practices, such as non-chemical alternatives to pesticides. Objectives of the SUPD could also be addressed by advisory and knowledge transfer measures (M1, M2) and the FAS. However, FAS, M1 and M2 effectiveness differed among Member States (see ESQ 3). In some Member States, SMR 10 was used to verify specific requirements under the SUPD (i.e. equipment inspection, prohibition of pesticides used near surface and coastal waters and appropriate means to avoid drifts outside the treated area). However, the SUPD is not included in cross-compliance as a specific SMR.

The greening measures on Ecological Focus Areas (EFA) and permanent grasslands, as well as AECM (M10) contributed to the objectives of the **Biodiversity Strategy**. Indeed, the aim of Action 8 under Target 3 is to promote the CAP direct payments to reward environmental public goods and to take into account the Water Framework Directive.

Finally, it is important to highlight that increased agricultural pressures on waterbodies arise from specific **EU trade policies**. The GATT Dillon Round and the Blair House Agreement led to an increase in imports of animal feed products, which indirectly caused negative impacts on water (e.g. specialisation in intensive livestock farming around big importation ports, leading to water pollution).

#### **5.14 EU ADDED VALUE– ESQ 14: TO WHAT EXTENT HAVE THE CAP INSTRUMENTS AND MEASURES CREATED EU ADDED VALUE WITH RESPECT TO SUSTAINABLE MANAGEMENT OF NATURAL RESOURCES AND CLIMATE CHANGE?**

*The EU added value was evaluated by investigating: the extent to which an EU-level approach is needed to reach the general and specific objectives of the CAP, and whether the issues addressed by the CAP continue to require further (joint) actions at EU level on agriculture and water legislation.*

*In answering this question, the contractor should carry out the analysis at the level of pressures and take into account the implementation choices offered to the Member States.*

##### **5.14.1 UNDERSTANDING OF THE QUESTION AND METHODOLOGICAL APPROACH**

The 'EU added value' of the CAP instruments and measures relates to actions and achievements that would not have happened if Member States had acted on their own, i.e. in the absence of EU provisions and support measures. In the present situation, as the CAP instruments and measures have been available and implemented depending on Member States needs and strategic choices for many years, it is difficult to estimate what would have been done by Member States in the absence of the CAP. Nevertheless, the likely situation of what would have happened (or may happen in the future) in the absence of EU instruments and measures was analysed by estimating the level of acceptance and integration into national interventions of the level of requirement of EU regulations<sup>133</sup>. As for instruments and measures implemented with a level of flexibility, the causal analysis of the implementation choices of Member States provides insight into what would have happened in the absence of EU provisions.

The methodology has been based on qualitative analysis of EU and national regulations, interviews with key stakeholders (Managing Authorities, farmers' representatives and environmental experts) in case-

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<sup>133</sup> The level of acceptance of EU measures was analysed based on interviews with key stakeholders and the analysis of the drivers of Member State implementation choices (see causal analysis). The level of integration of EU objectives was assessed based on a regulation analysis.



study Member States and a review of the relevant literature (e.g. previous evaluations of the CAP). It also has been built on the results from the effectiveness ESQs (ESQs 3 to 7).

The hypothetical counterfactual situation would consist in Member States being:

- free to set (or not) requirements and financial incentives for the farming and forest sectors, to meet the objectives of the WFD;
- no EU budget bound to address water issues.

It should be noted that the counterfactual is generally difficult to assess, since national initiatives implemented by Member States would probably have been implemented differently in the absence of an EU framework. However, interviews in case-study Member States and the comparison between EU measures and national or sub-national initiatives provide insight into this counterfactual situation.

#### **5.14.2 COMPARAISON OF NATIONAL AMBITIONS AS REGARDS AGRICULTURE AND WATER TOWARDS THE LEVEL OF REQUIREMENT SET IN EU REGULATIONS**

The analysis of the effectiveness of the CAP measures on sustainable water management showed that, within the current CAP framework:

- Pillar I cross-compliance and greening measures set a baseline of requirements in water management, aiming at contributing to the objectives of the Water Framework Directive (WFD).
- The RDP framework provided targets of 15% agricultural land and 4.3% forestry land under contracts to improve water management by the end of the 2014-2020 programming period.
- Among other things, the RDP measures promoted improved management of fertilisers and pesticides (Priority 4 to restore and preserve ecosystems related to agriculture) and increased efficiency in water use by agriculture (Priority 5 on promoting resource efficiency).

According to the evaluation of the CAP greening measures (Alliance Environnement, 2017), the level of ambition set by the greening measures is generally higher than could be expected of Member States acting alone. The evaluation suggests that Member States would have set a lower level of ambition in terms of crop diversification, the protection of permanent grassland and the provision of ecological focus areas (EFAs). In particular, Member States' choices for the implementation of the EFA measure suggest that they prioritised farmer interests over those of the environment (Alliance Environnement, 2017c). As for cross-compliance, the counterfactual is less clear, since the instrument (even though it has been revised) already existed in the previous programming period. Nevertheless, the analysis of Member State implementation choices for the 2014-2020 GAEC framework do not suggest ambitions going beyond the EU baseline to improve the protection of the water resources (see ESQ 1).

However, there are also some examples in which national rules are more stringent than those of the CAP: in these cases, it is less likely that the EU provides added value. For example, in Austria some sub-national laws are stricter than national or EU laws on fertiliser upper limits. In Croatia as well, some rules on liquid manure and slurry allowed during periods without vegetation were less stringent under the CAP<sup>134</sup>. According to interviews in the Netherlands, the level of requirements set by the CAP is not much higher than that of the national regulations which transposes the EU directives (Nitrates, Sustainable use of pesticides, etc.).

In Member States where water issues were not considered as a strong priority for the design of the RDP, the Managing Authority would probably have set lower requirements and/or allocated a smaller budget for water management in the absence of the CAP. This hypothesis is supported by interviews with Managing Authorities and farmer representatives in Poland, Croatia and Germany, where water issues were not considered as a strong priority for the design of the RDP.

In other Member States, water issues were successfully defended by water-related stakeholders and taken into account in the design process for the national implementation of the CAP (e.g. FR, NL, AT

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<sup>134</sup> Previous national implementation allowed for applying only a maximum of 50% of the yearly allowed amount of liquid manure and slurry in the period without vegetation (October-April). In addition, nitrogen from mineral fertilisers could not exceed 40 kg/ha on light (sandy) soils or 80 kg/ha on heavy (clay) soils in the period between harvesting time and 1 December. Fertilisation with nitrate-based mineral fertilisers was prohibited from 1 November to 1 February. The use of urea ammonium nitrate (UAN) on harvest residues was permitted as a special exception.



and FI, see ESQ 2). However, this does not imply that those Member States would have set a high level of requirements and allocated significant budgets to measures tackling water-related issues. In the Netherlands, the interviews clearly showed that, in the absence of RDP measures, a smaller budget would have been dedicated to such operations. The need to comply with EU directives as well as the CAP framework helped to put water on the agenda and to target a significant share of the RDP budget of actions for water. Moreover, the CAP helped in bringing together all stakeholders for better planning. In addition, one major driver for addressing water issues through CAP implementation seems to be the combination of the Water and Nitrates Directive requirements and the possibility of obtaining EU funds through CAP measures to comply with these requirements. Therefore, the EU added value from the CAP and water management is partly linked to its added value from implementation of water-related directives.

Water was also considered an important issue in Aragon (ES), Apulia (IT) and Romania, but decisions were made with the main intention of improving efficiency of water use. The requirements in water quality issues may not have been as high in these Member States (with the implementation of the Nitrates Directive especially) if not for the CAP. Furthermore, interviews in Spain highlighted that implementation of the CAP has enhanced awareness among policymakers of water-quality issues and has also fostered the improvement of water management. In Finland, stakeholders interviewed also considered that restrictions on use of nutrients on arable land would probably not have been implemented without the CAP. Regarding water quantity issues, interviews in Romania highlighted that the CAP, through Article 46 of Regulation (EU) No 1305/2013, sets a higher level for the alleviation of the pressures on water abstraction than would probably have been carried out nationally. According to interviews with farmer representatives in Spain, the CAP has probably accelerated changes in practices through incentives and penalties, especially in terms of modernisation of irrigation.

#### **5.14.3 ADDED VALUE OF THE CAP INSTRUMENTS AND MEASURES CHOSEN BY THE MEMBER STATES COMPARED TO NATIONAL INITIATIVES**

This analysis considers the actual added value of the CAP implementation, taking into account the effects of the CAP measures compared to the effects of existing or potential (i.e. that would have been implemented in the absence of the CAP) national policies. Interviews with national authorities and farmer representatives in case-study Member States (e.g. ES, HR, NL, PL, RO) and previous evaluations (Alliance Environnement, 2017c; Alliance Environnement, 2018) indicate that, in the absence of the CAP, it is very likely that **most Member State would have allocated less budget to environmental issues, including water**. This means that the incentives for stakeholders to adopt sustainable water practices would have been lower. For instance, interviews in Spain highlighted that EU subsidies have been key in obtaining general agreement of the irrigator community on projects. In the absence of the CAP the subsidy may have been lower and agreements more challenging to obtain. Interviews in Croatia also highlighted this importance of the CAP has an incentive for farmers to change their practices.

In the absence of the CAP, **water-related measures may not be as strictly verified as required by CAP provisions**. One aspect of the performance of the greening measures is the application of the Integrated Administration and Control System (IACS) to verify farmers' compliance. While this entails greater administrative cost for Member States, it also increases the likelihood of compliance compared to a scenario in which similar measures are implemented under cross-compliance, and perhaps also in the case of national or sub-national measures (Alliance Environnement, 2017c).

**The added value of the CAP can depend on the Member States concerned.** For instance, in Germany and France, advisory services are well structured and were available to farmers before being required under the CAP (i.e. before the introduction of the FAS instrument in 2007). Furthermore, these services are still supported under regional or national funds even though RDP measures M1 and M2 could be used to finance it. However, in other Member States such as Romania, where advisory services are much less structured and suffer from a lack of financing, the EU framework has provided an incentive for the Managing Authority to develop these services (due to the horizontal FAS instrument) and a source of funding for their functioning (through RDP measures M1 and M2).

However, **CAP regulatory standards may be in some cases counterproductive** because of the administrative burden and efficiency loss involved (e.g. Article 46 of Regulation (EU) No 1305/2013, see ESQs 9-10). For instance, according to interviews with the Managing Authorities in the Netherlands, incentive for EU funding is hindered by the administrative burden for the farmers. Stakeholders in France

and Finland also found that the EU framework has added administrative burden. Therefore, the flexibility given to Member States (or when relevant regional Managing Authorities) is key to ensure that the measures are adapted to local challenges and avoid the negative side effects of the policy (see ESQ 11).

#### 5.14.4 NEED FOR AN EU-LEVEL ACTION TO ADDRESS WATER ISSUES

**Water is a common good and a transboundary subject.** As stated by the WFD, water requires management at the scale of the river basin. Therefore, addressing this topic at the European Union level is relevant. The implementation of the WFD on international river basin districts requires coordination with the neighbouring Member States and non-Member States<sup>135</sup> concerned. A recent report on the implementation of the Water Framework Directive (European Commission, 2019) showed that, even if the transboundary approach has improved compared to the first RBMP cycle, degree of cooperation differs. As a whole, the case-study stakeholders' opinions agree that common action is relevant to address water issues on a broader scale, and especially in the case of cross-border catchments (e.g. Rhine in FR and NL, Danube in AT, HR, RO, etc.). However, some Member States (NL, AT, PL and FI) mentioned the importance of allowing flexibility to Member States in the choice of the relevant measures to be applied to target common EU objectives, as local authorities have better knowledge of local issues (see ESQ 11).

**EU-wide requirements may be more acceptable** to stakeholders than a single Member State's action would be (Alliance Environnement, 2017a), suggesting potential gains in efficiency and effectiveness. Furthermore, joint action provides a uniform framework for all Member States and reduces or even prevents competition distortion based on different environmental standards set nationally. Notably, individual Member States cannot achieve competitive advantages by lowering their standards. This holds true when the flexibility provided to Member States to set environmental standards (e.g. standards for GAEC) does not lead to huge differences in implementation. Case-study interviews confirmed the importance of joint action at EU level to ensure a common objective and framework on environmental issues, including water protection.

#### 5.14.5 ADDITIONAL ADDED VALUE BROUGHT BY THE EU LEVEL

The interviews held in the case-study Member States make it possible to identify the following additional added value of joint action on water within the framework of the CAP:

- **Higher legal security for farmers** (DE, FR, NL, AT), since the same rules are to be implemented by all Member States (even though the requirements can differ due to subsidiarity).
- **Consistency of the legislation over time** (NL, FI): the regulatory framework will not drastically change (even though some modifications can be made) during the programming period.
- **National and local authorities are more aware of water issues** (ES, HR, IT, PL). Furthermore, the implementation of environmental standards at EU level ensures that the 28 Member States act towards agreed common objectives, sharing efforts and resources while following measurable criteria<sup>136</sup>.
- **Coherence with other EU policies** (especially the WFD and ND), notably through cross-compliance. The subsidiarity principle also facilitates coherence with national and sub-national policies (see ESQs 12 and 13).
- **Increased effectiveness, efficiency or coordination, through EU networking, exchange of good practices, shared knowledge and scientific endeavour.** Both the ENRD and EIP-Agri network activities promote and share good practices for water management among RDP Managing Authorities and other stakeholders<sup>137</sup>, and they provide forums for discussion between Member States and regions (Alliance Environnement, 2018). According to interviewees in North Rhine-Westphalia (DE), Croatia and Austria, the EU framework helped promote exchanges with other Member States on the subject of water. However, interviewees in Poland and Finland mentioned that, currently, knowledge exchange mainly occurs at project level, within the Member State. The

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<sup>135</sup> Article 3 of the Water Framework Directive.

<sup>136</sup> See <http://www.europarl.europa.eu/cmsdata/122746/Pieter%20de%20Pous%20-%20EEB.pdf>.

<sup>137</sup> e.g. The EIP project 'Water Partnership of the Ebro' (Aragon-ES), which brings together various stakeholders (e.g. researchers, irrigator community, farmer organizations) to improve water governance and pursue innovation.

EU framework has also enabled the collection of data on farming practices in all EU countries, due to the mandatory monitoring and evaluation to be carried out by Member States.

#### **5.14.6 REPLY TO THE ESQ 14**

The EU added value created by the CAP instruments and measures relates to actions and achievements that would not have happened if Member States had acted on their own, which is to say in the absence of EU provisions and support measures. From the literature review, findings from previous analysis and case-study interviews, it appears that the EU framework brought, to some extent, a certain added value to the process of tackling water issues via agriculture at the EU level. The EU framework supported awareness-raising on water issues and put the topic of water higher on the agenda. Overall, the CAP framework allowed for more budget to be allocated to water-related measures than would have been possible at Member State level.

In some Member States (e.g. DE, ES, HR, IT, PL, RO and FI), there is evidence that the CAP framework stimulated the implementation of a higher level of requirements and/or budget regarding water and environmental issues than would have been done nationally (e.g. by fostering the development of advisory services in Romania, strengthening the level of verifying compulsory measures, supporting changes of practices, etc.). But this added value is counterbalanced by the administrative burden, associated to the EU requirements for the design, implementation and reporting of the CAP, according to stakeholders interviewed. The CAP framework creates a level playing field for all Member States, thereby preventing potential competition distortion arising from different environmental standards set nationally. The basic spatial unit to target the sustainable management of water is the river basin district. As water requires transboundary management, joint actions are necessary to ensure a certain consistency (e.g. to avoid water pollution from a Member State located upstream which would impact a Member State located downstream). Setting up common objectives and legal framework (e.g. on water status) ensures fairness between Member States and is relevant in tackling environmental (including water) objectives. Nonetheless, a certain degree of flexibility is key for Member States to be able to adapt their implementation choices to their local context and thus achieve specific objectives. Finally, the EU level brought additional added value by ensuring coherence between the CAP and the WFD objectives and promoting, to a certain extent, exchanges between Member States about water (e.g. through EIP projects and ENRD). This latter aspect could probably be improved, and the CAP could promote more interaction and knowledge transfer between Member States.

## 6 CONCLUSIONS AND RECOMMENDATIONS

### 6.1 CONCLUSIONS

#### 6.1.1 MEMBER STATE IMPLEMENTATION CHOICES ON CAP MEASURES ADDRESSING WATER ISSUES

Under the horizontal Regulation (EU) No 1306/2013, cross-compliance instruments strengthen the controls of requirements established outside the CAP, such as the Nitrates Directive (Standards for good agricultural and environmental conditions of land (SMR)). In addition, they provide for minimum mandatory standards of good agricultural and environmental condition of land (GAEC), which Member States specify with concrete requirements. Three GAECs directly target water (buffer strips, authorisation for water abstraction in case of irrigation, prohibition of discharging listed dangerous substances). All basic rules have been established, for instance buffer strips along water courses or obtention of a license by farmers for abstraction of water for irrigation. However, some additional requirements can vary according to Member States' choices (e.g. no prohibition in the application of pesticides under GAEC 1, requirement of appropriate means to measure the volumes of water abstracted under GAEC 2). Other GAECs and SMRs have indirect positive effects on waterbodies, by improving soil water-retention capacity, limiting erosion or maintaining specific land covers beneficial for water. However, the study reveals that case-study Member States usually settled for minimum standards.

The greening measures of Regulation (EU) No 1307/2013 do not directly address water issues and rely on three EU-wide practices aiming to protect soil quality (crop diversification), farm biodiversity (ecological focus area (EFA)) and carbon sequestration (permanent grassland). While these measures could have a positive indirect impact on water quality, the implementation choices of case-study Member States were not ambitious enough for greening measures to result in significant changes in farming practices (e.g. broad choice of eligible EFAs, some EFAs being already required under other schemes, crop diversification equivalence granted to maize growers in France under mono-cropping systems). The greening measures, as implemented by Member States, are therefore guaranteeing the maintenance of minimum beneficial practices by farmers.

Under Rural Development Regulation (EU) No 1305/2013, Member States allocated nearly €80 billion – i.e. more than 50% of the overall budget – to Priority 4 for restoring, preserving and enhancing ecosystems related to agriculture and forestry, Focus Area (FA) 5A for increased efficiency in water use, FA 5D for reducing greenhouse gases emissions from agriculture, and FA 5E for carbon sequestration. The Member States did not distinguish the budget targeting operations under FA 4B for enhancing sustainable water management and FA 4C for limiting soil erosion<sup>138</sup>. However, it was assumed that budget allocated to Priority 4 and Focus Areas 5A, 5D and 5E related to some extent to operations expected to have positive effects on water<sup>139</sup>. The main measures programmed in the Rural Development Programmes (RDPs) under Priority 4 and Focus Areas 5A, 5E and 5D are, by order of importance: Rural development measure (M) 10 Agri-environment-climate measures (AECM) (33.4% of the dedicated budget), M13 Compensatory allowance scheme for areas with natural constraints (31.8%), M11 Organic farming (12.5%), M8 Investments in forest area development and improvement of the viability of forests (9%) and M4 Investments in physical assets (7.22%). However, the effects of M13 on water are indirect and depend on the types of farming supported.

Despite the significant budget allocated to Priority 4 and Focus Areas 5A, 5D and 5E, the analysis of the RDPs measures for sustainable management of natural resources and climate action as implemented by the Member States revealed that only a few measures were actually supporting operations directly targeting water quality and quantity issues (e.g. M10 AECM, M11 Organic farming, M4 Investments, M12 Natura 2000 and WFD).

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<sup>138</sup> Under Priority 4, Focus Area (FA) 4A aims at enhancing biodiversity. Operations financed under this Focus Area are not always related to water, and it was not possible to distinguish the budget allocated to FA 4A from those of FA 4B enhancing sustainable water management and 4C limiting soil erosion.

<sup>139</sup> Investments in expansion of irrigation would normally be programmed under FA 2A for restoring and enhancing the competitiveness of farms.

Other CAP instruments and measures can have indirect impact on water quality and quantity, depending on the distribution of the support granted and the types of farming supported. Implementation of the Basic Payment Scheme, together with Voluntary Coupled Support and Areas with Natural Constraints (ANC), can contribute to support small diversified holdings mostly in grass-fed animal sectors located in ANC areas. Except for Germany, the Netherlands and Austria, voluntary coupled support was granted to the livestock and protein sectors in all the case-study Member States, with potential benefit for the water status depending on the type of livestock farming supported (extensive grazing systems).

### **6.1.2 DRIVERS AND REASONS BEHIND THE IMPLEMENTATION CHOICES**

The drivers behind the implementation choices of the CAP framework vary between Member States. Many of them considered administrative, economic and historical factors first. Cross-compliance and the greening measures were implemented to apply the mandatory environmental practices required by EU legislation, with different levels of ambition concerning the environmental objectives.

Interviews with the Managing Authorities highlighted that the environmental issues were mainly considered and addressed in the RDPs, i.e. based on voluntary measures for farmers. As stated by the stakeholders, the need to alleviate agricultural pressures affecting water quantity and/or quality was considered in all RDPs of case-study Member States. The involvement of water authorities during the design process of the RDP, notably through the co-funding of RDP measures, played a significant role in the implementation of measures supporting beneficial practices for the promotion of sustainable management of water. Another driver likely to contribute to the consideration of water issues in the RDPs is the concomitant working out of the RBMPs. Indeed, similar stakeholders can be involved in the design process of both documents, as seen by the successful case in Finland. Economic issues and budgetary allocation (and sometimes other environmental issues) were mentioned by the interviewees as other drivers behind the choices made by the Managing Authorities.

On the farmer side, the implementation of the water-relevant CAP measures (M10 AECM, M11 Organic farming, M4 Investments) is motivated by economic reasons. As mentioned by the farm advisers surveyed, the need to comply with new standards and, the environmental and climate motivations were secondary reasons pushing farmers to implement M4 Investments, M11 Organic farming and M10 AECM. As shown by the FADN analysis, geographical and economic factors also influence the choices of beneficiaries. M4 Investments was usually used more by farmers with high income and a large utilised agriculture area (UAA) in case-study Member States, whereas the M10 AECM beneficiaries are mainly mixed farmers growing more than four crops and having large UAAs. It was pointed out during the interviews that water-related measures are less attractive for intensive farming systems, generally located in regions facing water problems (Germany, France and Austria).

### **6.1.3 EFFECTIVENESS**

The CAP framework was assessed as effective for maintaining minimum practices beneficial for water quality; however, its effects on the quantitative aspects of water are rather contrasted.

The CAP instruments and measures of interest to prevent further deterioration of waterbodies' chemical status are the cross-compliance and, to a lesser extent, the greening measures. They guarantee minimum good agricultural practices, which help reduce fertilisers/pesticides and their transfer into waters, as well as prevent further deterioration of soil and bank erosion (e.g. buffer strips, retention of landscape features, crop diversification, etc.). RDP measures such as M10 AECM, M11 Organic Farming, and to a lesser extent M4 Investments, encourage the implementation of agricultural practices that help improve the chemical status of waterbodies. However, RDP measures are voluntary, and their uptake varied between Member States over the assessment period.

Regarding water abstraction, the percentage of farmers benefiting from M4 support under FA 5A for increased efficiency in water use was close to zero in the Member States studied. Furthermore, water-demanding sectors such as maize, vegetables, fruits and flowers significantly rely on CAP Pillar I, which represent a significant share of their income. According to the CMEF indicators, the percentage of irrigated land switching to more efficient irrigation systems was very limited at the EU level. Moreover, when combined with investment in existing irrigation systems, M4 Investments can support the expansion of the irrigation systems in areas where the quantitative status of waterbodies is less than good, provided that minimum savings in the water used for irrigation are achieved at farm level.



However, in the case-study Member States, no clear verification of the water savings achieved is carried out after the completion of the investment.

The absence of data makes it impossible to draw final conclusions on the effect of water-related instruments and measures on the water-holding capacity of soil. In general, Member States where water-holding capacity is low are not always those where CAP instruments and measures were implemented most effectively. On the other hand, Germany have seized the opportunities given by GAECs and greening measures (e.g. permanent grassland, GAEC 1 on buffer strips, GAEC 4 on minimum soil cover, GAEC 5 on soil erosion) to deal with the low soil retention capacity in the region of North Rhine-Westphalia.

The effects of other CAP instruments and measures on water are also difficult to assess. The income support provided by the direct payments is significant, and the FADN analysis showed that Pillar I support is essential for the profitability of many farm types in the case-study Member States. VCS and M13 were also assessed as potentially relevant to maintain some specific types of farming beneficial for water. However, their effects vary according to the implementation choices of Member States.

It was difficult to assess the overall impact of the combined CAP framework on the improvement of waterbodies status, mainly due to 1) limitations of available data, i.e. WISE data do not enable assessment whether there was a change, between the 1st RBMP (2010) and the 2nd RBMP (2016), and 2) varying effects of the CAP instruments and measures pursuant to Member States' implementation choices (budget allocation, eligibility criteria, selection criteria), the level of uptake and the types of operations supported. However, according to Member States' reporting, carried out under the RBMP, agriculture remains among the main pressures preventing the achievement of good water status for waterbodies.

Finally, soil and climatic conditions also highly influence the effectiveness of the instruments and measures, whereas economic factors play a significant role in inducing farmers to implement specific agricultural practices or produce specific crops.

#### **6.1.4 TECHNICAL AND SOCIAL INNOVATIONS**

In the EU, as well as in the rest of the world, innovations are identified as a major lever for enhancing sustainable water management. The literature review showed the diversity of technological and social innovations implemented across the EU that may affect water management in the agricultural sector. In particular, precision farming and optimised soil management practices (in relation to conservation agriculture) have developed in recent years, especially in central and western EU, and allow farmers to use resources in a more efficient way (i.e. fertilisers, plant protection products, water).

According to the survey carried out in the case-study Member States, the adoption rate of social innovations is on average lower than that of technological innovations. The adoption rate of innovations varies across the EU, e.g. the use of optimised soil management equipment is more developed in western and central EU and high-efficiency irrigation systems are more common in Mediterranean Member States. Some innovations which could respond to specific challenges linked to water management are still little developed, e.g. reuse of treated wastewater which can be suitable in arid environments.

The effects of innovations on water vary depending on the farming system, the biogeographical region and the socioeconomic context where they are implemented, and on how they are implemented. Farmers' knowledge, training and awareness are of paramount importance in order to avoid the misuse of innovations and its rebound effects on water quality and/or quantity. Effective advisory activities and demonstration projects can help to avoid these negative effects.

Overall, with the data available for this evaluation, it was not straight forward to measure the effects of innovations. However, it is assumed that technological and social innovations have helped lead to an improvement in water management in the EU (e.g. with the improvement of the efficiency of irrigation equipment in the southern EU). Further benefits could arise from enhanced development and dissemination of innovations and the promotion of good practices related to their use (e.g. to avoid rebound effects).



### 6.1.5 EFFICIENCY

Greening measures and cross-compliance effectively contributed to maintain specific practices beneficial for water protection. The administrative costs associated with the verifications of cross-compliance and greening measures are considerable but deemed as necessary in view of the benefits obtained.

Under Pillar II, the targeting of RDP measures towards relevant beneficiaries/geographical areas regarding water issues is key for ensuring maximum efficiency in achieving the CAP objectives related to water. RDP measures M10 AECM and M11 Organic farming are the most effective RDP measures in reducing agricultural pressures on water. Nonetheless, in some Member States, the calculation of the payment rate of M10 AECM fails to ensure sufficient uptake, in particular by highly productive farms. As for M11 Organic farming, payment rates can be considered as efficient, insofar as organic farming prevents water pollution from fertilisers and pesticides and its associated depollution costs. M15.1 Forest-environment and climate services and M8.1 Afforestation were both significant measures fostering land covers beneficial for water protection. However, they generate heavy administrative burden that is mostly necessary but could be reduced (notably through collective application).

In view of the budget spent and the results achieved, M4 Investments targeting water-relevant operations does not seem very efficient for protecting water from pollution. Few data are actually available to assess the effectiveness of the measure towards water-related CAP objectives. Furthermore, the aid intensity of the measure was sometimes found to be not attractive (in the Netherlands, Poland and Alsace (France)). Additionally, the interviewees reported that M4 Investments generated heavy administrative burden associated with the EU provisions and their implementation by Member States. On water quantity, the administrative burden generated by specific conditions for investments related to irrigation (Article 46 of Regulation (EU) No 1305/2013) has not led to sufficient results in actual water savings.

Overall, payment rates for M1 Knowledge transfer and M2 Advisory services were found to be set at an efficient level. However, the EU provisions, which generate significant administrative burden, often discouraged their implementation and uptake. M16 Cooperation was also mentioned as burdensome for the beneficiaries. The 'Omnibus' regulation (EU) 2017/2393 provided simplification, but the stakeholders interviewed reported that it came too late to enable significant implementation of the measures during the programming period.

### 6.1.6 RELEVANCE

At the EU level, the CAP offers the possibility of addressing relevant needs identified in terms of agriculture and water quality and quantity. However, in practice, the actual objectives targeted by the instruments and measures depend on the implementation choices of the Member States/Managing Authorities. Some specific pressures arising from agricultural practices are still not addressed by the CAP. Hence, specific measures to target the use of pharmaceutical products or cleaning products in the livestock sector, for example to wash out equipment in milking parlours, should be integrated into the overall CAP framework. Another aspect which is not addressed sufficiently is the need to help irrigated farms to adapt to water scarcity stress episodes, by supporting their diversification with rainfed crops in area prone to droughts. Then, the greening measure on crop diversification could better address fertilisers and pesticides use for example by requiring crop rotation.

At the Member States/Managing Authorities level, the identification of needs in the case-study RDPs is consistent with the orientations of the RBMPs, even though some needs may be underestimated in RDPs (e.g. the need to improve the state of aquatic ecosystems and associated wetlands). The analysis of the CAP implementation in case-study Member States has shown that water-related needs have generally been taken into consideration by the Member States/Managing Authorities. In many cases (e.g. the Netherlands, Poland, and Slovenia), the Rural Development measures were explicitly designed and implemented in order to address issues identified in their RBMPs, thereby favouring the relevance to water-related priorities. RDP measures can also be targeted at areas facing specific issues in water resources, thereby ensuring their relevance to local needs (e.g. the AECM measure in Finland, the greening permanent grassland measure in Scotland (United Kingdom), etc.). Furthermore, water-related needs not covered by the CAP are sometimes addressed through national policies (e.g. actions to raise farmers' awareness about water issues in North Rhine-Westphalia, Germany).

At farm level, CAP measures can address farmers' needs provided that they are adapted to their local context. When farmers need to significantly change their practices (e.g. to adapt to new water-related provisions, to climate change or to changes in societal demand), support in the form of advisory actions, training, investment support and other financial support is often crucial.

### **6.1.7 COHERENCE**

#### **Coherence within the CAP**

The CAP instruments and measures were assessed to be partially coherent with the objective of sustainable management of natural resources and climate action. Some synergies between CAP instruments and measures were identified, such as the provision of tailored advices (Farm Advisory System, M1, M2) to better implement other water-related measures (M4, M10, M11 and M12). However, some conflicts were also identified, for instance in relation to irrigation support, as it is difficult to guarantee that supported investment will not lead to increase pressure on water resources, especially in cases where irrigated area increases. Then, sector-specific support granted under the CMO regulation can be used to support investment in irrigation under less stringent rules than M4 Investments. Furthermore, sectors with the highest impact on water quality and quantity (e.g. fruits, flowers, wine) are not always eligible for direct payments and thus not subject to corresponding greening and GAEC requirements. Moreover, greening practices do not apply on permanent crops. Additionally, support for water-related practices with negative effect on climate is inconsistent with climate objectives (e.g. support to irrigated sectors in areas where water resources are already overexploited). In the Netherlands, some inconsistencies may hinder farmers from becoming involved in potentially beneficial measures for the environment including water issues (e.g. M10 fostering banks restoration that leads to reduction in eligible land). Member States' implementation choices are determinant for the consistency of the instruments and measures with the objective of sustainable management of natural resources and climate action. However, some limitations arose from Member States' implementation choices (e.g. authorisation to use pesticides on buffer strips under GAEC 1) and farmers' choice of practices (e.g. use of pesticides on nitrogen fixing crops and catch/cover crops outside EFA).

#### **CAP consistency with EU policy on water**

The CAP framework is partially coherent with the water-related objective of environmental/climate legislation and strategies (i.e. the Water Framework Directive, the Nitrates Directive, Sustainable Use of Pesticides Directive and the Biodiversity Strategy). The CAP instruments and measures which contribute to the objectives of the concerned directives are mostly cross-compliance, the greening measures, M10 AECS, M11 Organic farming and M4 Investments. Furthermore, the CAP has been identified as the most important EU fund for implementing the objectives of the WFD<sup>140</sup>.

However, inconsistencies arise in case support is granted to increase irrigated areas where waterbodies with less than good quantitative status are affected. Also, the delivery of direct payments to specific sectors with mixed effects on water depending on their agricultural practices prevents full coherence of the CAP with EU water policy, as well as the fact that specific sectors with potential impact on water quality and quantity are not constrained by the water-relevant CAP instruments and measures in all Member States (i.e. cross-compliance GAEC and the greening measures).

### **6.1.8 EU ADDED VALUE**

The assessment showed that the EU framework brought a certain added value by raising awareness on water issues and putting the topic of water higher on the agenda, stimulating the implementation of a higher level of requirements and budget for water and environmental issues, creating a level playing field for all Member States, ensuring equity between Member States and promoting exchanges between Member States on water (e.g. through the European Network for Rural Development). However, following opinions of certain stakeholders, this added value was accompanied by a potentially higher administrative burden of the CAP (including water-related measures) than expected if managed nationally or regionally.

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<sup>140</sup> Notably, RDPs have been the main source of funding for Programme of Measures in the 2nd cycle RBMPs.

## 6.2 RECOMMENDATIONS

### 6.2.1 POLICY RECOMMENDATIONS

#### Policy design

The subsidiarity principle applied to the current 2014-2020 CAP framework rebalances the responsibilities between the EU and the Member States. Member States are in charge of tailoring CAP interventions to meet local needs and maximise their contributions to EU objectives. However, the potentially positive effects of CAP instruments and measures on water are often hindered by less ambitious implementation choices made by Member States. **Thus, to guarantee that the objective of sustainable management of water is met and to effectively reduce the agricultural pressures on water, the legislative body should require Member States to set ambitious targets and achieve minimum mandatory results that should be precisely monitored.** Notably, operations supported under water-related Focus Areas 4B and 5A should be clearly identified. Furthermore, Member States could be required to quantify the contribution of the CAP instruments and measures to the achievement of environmental objectives included in environmental legislation, and to set specific targets for the reduction of pesticides/fertilisers consumption or for organic farming development.

The way the current CAP is implemented generates various effects according to the Member States, depending on their implementation choices (budget allocation, eligibility criteria, selection criteria), the measures' level of uptake and the way the beneficiaries chose to implement them. **It is recommended that higher provisions in terms of minimum requirements are set, as regards water-related eligibility criteria and dedicated share of budget oriented towards water Focus Areas, etc.** This could be enhanced by requiring Member States to carry out a SWOT analysis and a needs' assessment and to establish a sound intervention logic for the implementation of Pillar I instruments, in order to ensure that environmental needs, including sustainable management of the water resources, are better addressed.

The current overall budget dedicated to water-relevant measures is deemed globally sufficient for measures M10, M11, M8 and M4. **However, the share of budget allocated by Member States to water-relevant Focus Areas could be increased under measures M1, M2, M12, M15 and M16.**

Whereas cross-compliance currently ensures that beneficiaries of the CAP direct payments implement mandatory minimum practices, it does not affect the level of fertilisers or pesticides used or the livestock density, and it has failed to prevent associated agricultural pressures on water quality and quantity. Hence, **cross-compliance and direct payments entitlements should be reconsidered in order to better support less profitable farms implementing farming practices beneficial for the environment and water resources.**

In some cases, the VCS have been assessed as potentially relevant to maintain specific types of farming beneficial for water; however, this support could be better oriented towards environmentally-friendly holdings. For instance, **additional eligibility criteria should be implemented for the granting of VCS towards the livestock sectors, e.g. eligible criteria considering the pasture area available by livestock unit could help decrease the nutrient pressure on water.**

#### Effectiveness

Cross-compliance and greening measures are systematically implemented by almost all farmers benefiting from the CAP support at the EU level. For this reason, **any increase in the requirements set under these measures linked to water, will result in immediate positive effects from a water perspective. Therefore, any exemptions lowering the level of standards required under these schemes should be avoided or carefully examined to avoid negative effects on water.**

GAEC 1 on buffer strips has considerable potential for protecting water from pollution, but also for protecting riparian margins. However, not all Member States forbid the application of pesticides or tillage on buffer strips. **It is thus recommended that all Member States ban the spreading of both fertilisers and pesticides on buffer strips and reduce the possibility of ploughing these areas.**

Only some Member States verify the livestock manure storage distance from water under GAEC 3 (in FI, FR or DE), the proper disposal of pollutants and the absence of leakage from storage tanks (in DE). **The requirements checked during the controls under GAEC 3 should thus be reviewed to consider these aspects and effectively protect water bodies.**

Despite Article 46 of Regulation (EU) No 1305/2013, it is difficult to guarantee that supported investment will not lead to increased pressure on water resources, especially in cases where the irrigated area increases. In areas where the quantitative status of waterbodies is less than good, conditions set by Article 46 of that Regulation authorise the expansion of irrigated areas when combined with investments in existing irrigation systems and require reduction in the total amount of water abstracted at farm level. The EC guidelines for the strategic planning of RDPs (EC, 2013) promote the use of additional safeguards, but this study did not find evidence that the guidelines are being followed. **It would be relevant to adopt a result-based approach in areas where water bodies are failing to achieve good quantitative status, in order to guarantee effective reduction of the water abstracted by calculating the savings achieved. Also, the authorisation for irrigation, checked under GAEC2, should more systematically take into account the quantitative status of the water bodies, set a maximum limit to protect the freshwater resources and control the total volume of water abstracted.**

The modernisation of the irrigation system often led to the introduction of new, more water-demanding crops. In this case, investments in more efficient irrigation systems does not necessarily lead to reduced water consumption. **Thus, in addition to improvements in irrigation infrastructures, it is key to also work on irrigation and crop system management. Advisory services should be systematically oriented toward these aspects, when investments in irrigation systems are supported under M4.**

Furthermore, artificial drainage is sometimes supported under M4. However, its use can have indirect negative effects on water quality by carrying pesticides and nitrates directly into surface water. **To avoid negative effects on water, it is important to set the requirement to establish a green buffer zone at the end of the drainage system as an eligibility criterion. The establishment of such a buffer zone should be subject to on-the-spot verification.**

The case studies highlighted that an incentive voluntary approach is favoured by the authorities in order to stimulate farmers changing their practices. However, voluntary measures are taken up to different extents by farmers depending on the Member States, thus limiting the positive effects on water. **Either the voluntary measures should be either very attractive, to encourage farmers to implement them (notably farmers engaged in intensive farming systems generating high pressures on water resources), or a significant effort must be undertaken to raise farmers' awareness on water issues and advise them on the changes to be implemented to address those issues. Hence, financial means are deemed as necessary to encourage effective changes to be undertaken on a voluntary basis.**

The current AECMs provide for offsetting the additional costs incurred and income foregone as a result of the farming practices. However, the payment rates for AECMs have often been based on an average estimation of income loss without taking into account local differences, thus leading to unattractive payment rates for some of the potential beneficiaries and, as a result, to insufficient uptake. **It is thus recommended to increase the payment rates delivered under the AECM scheme so that it is a real incentive for farmers.**

The evaluation highlights that raising awareness of farmers on the impact of agricultural practices and the delivery of suitable advisory services and training are important drivers for the changes of practices. However, the Farm Advisory System is not effective in all case-study Member States. **To ensure that the FAS is effectively operational at the EU level, assistance and financial support should be granted to the Member States for its operational functioning. The FAS could also contribute more to the implementation of the Sustainable Use of Pesticides EU Directive by granting more weight to Integrated Pest Management practices.**

## **Efficiency**

Whereas the need for information actions and advisory services was demonstrated to target water issues, the M1 and M2 were often not implemented or experienced a low level of uptake because of the administrative burden associated with their implementation.

The collective approach used in the Netherlands for the implementation of M10 was assessed as very efficient, as it significantly reduced the transaction costs and administrative burden associated with its management by the authorities and beneficiaries. **When many farmers/larger areas are involved, it is thus recommended to further encourage collective actions for the implementation of the RDP measures, deemed as more efficient and effective on the associated outcomes on water.**

In general, conversion to organic farming, in which the use of artificial fertilisers, herbicides and pesticides is forbidden, can alleviate agricultural pressure on water and enhance the provision of water as a public good in the long run. This is particularly true when considering the costs associated with the depollution of water as a consequence of agricultural pollution. However, **conversion to organic farming is costly and laborious for farmers and should accordingly be supported under M11.**

The eligibility and selection criteria set by Member States under M4 do not always ensure effective targeting of the support to address water-related issues. The efficiency of the measure on water protection is thus limited. **Improved targeting of relevant operations addressing water issues by Managing Authorities could have significant positive effects on water resources given the share of Pillar II budget dedicated to this measure, and it can justify the associated administrative burden.**

## **Relevance**

The evaluation highlighted the significant pressures on water arising from the fruits, vegetables and wine sectors, which are big users of fertilisers, phytosanitary products and water irrigation. Producers of those sectors are not eligible for direct payments entitlements in every Member States. These farmers are thus not bound to meet the minimum GAEC and greening requirements. **It would be beneficial to extend the regulatory basis set by cross-compliance to farmers not benefiting from the CAP direct payments or to find out other measures to limit their pollution of water.**

Specific pressures arising from agricultural practices are still not addressed by the CAP. Hence, **specific measures to target the use of pharmaceutical products or cleaning products in the livestock sector, i.e. for washing out equipment in milking parlours, should be integrated into the overall CAP framework, possibly under cross-compliance.**

Another aspect which is not addressed sufficiently is the need to help irrigated farms to adapt to water scarcity stress episodes, by supporting their diversification with rainfed crops in areas prone to droughts. Hence, **the promotion of alternative cropping systems (e.g. less water-demanding or drought-resistant crops, varieties and hybrids, and minimum tillage techniques to improve soil moisture) is considered as a major issue in the context of climate change and should become a central part of the strategy of the future CAP.**

To address water scarcity, water reuse was mentioned by the stakeholders interviewed as a very important measure to reduce the abstraction of freshwater and tackle the impact of climate change. The EU legislative framework for water reuse is currently under review (see ESQ 6). **The RDPs should also support investments in water-collection equipment at farm level, particularly in areas subject to water quantity issues.**

Finally, **the issue of livestock trampling along watercourses should be more generally addressed by GAEC 5.** Indeed, this problem is currently checked in few Member States only. It should be systematically checked on the-spot as livestock trampling is a pollution source that affects water quality to significant extent. If necessary, support could be given through M10 to those farmers who want to protect their waterbodies from livestock trampling using physical protections.

The relevance of the CAP instruments and measures to address water issues increases in case of close cooperation between the authorities managing the RDP and those managing the RBMP. Such close cooperation existed in some case-study Member States and led to the implementation of specific RDP measures targeting areas assessed as extremely vulnerable under the RBMP. **Therefore, the implementation schedule should be harmonised so as to increase the potential synergies between both schemes.**

## **Coherence**

Synergies were identified among CAP measures and can be taken as examples and promoted widely (e.g. advisory and knowledge exchange measures promoting advice, information and training for M10, M11 and M12 beneficiaries). **To successfully address water issues, it is thus recommended to implement the 'knowledge measures' (M1, M2) in association with the measures supporting changes in practices.**

The 'Omnibus' regulation authorises Member States to consider land that has not been ploughed within a period of five years as permanent grassland. However, this has also led to early ploughing of temporary grasslands to avoid their change into permanent grasslands, thereby increasing the risk of runoff and erosion and therefore of negative impact on water quality. **It is thus recommended to review the requirements of permanent grassland in order to avoid that farmers ploughing it every five years and keeping it classified as 'arable land'.**

## **EU added value**

The EU framework is necessary to effectively address water issues as water is a cross-border resource. The basic spatial unit to target the sustainable management of water is the river basin district. For these reasons, in the case of international river basins, **it is recommended that the RDPs implemented in Member States on both sides of borders link their strategies in order to jointly tackle the water issues at stake.**

## **6.2.2 DATA RECOMMENDATIONS**

The lack of proper data to assess the changes in farming practices and corresponding effects on agricultural pressures was a significant barrier to the evaluation of the impact of the CAP on water. **It is recommended that the effects of the measures implemented be better monitored in order to address water sustainable management.**

Under this programming period, the Member States allocated budget under the RDP measures to Priority 4, not making it possible to distinguish the share dedicated to Focus Area 4B on improving water management. Also, the output data are not available by Focus Area under Priority 4. **The CMEF indicators should make it possible to distinguish the operations related to water supported by the RDP, notably the information actions undertaken under M1 and M2, the non-productive investments supported under M4.4, the operations improving water management, including fertiliser and pesticide management under M10 and the innovative collaborative actions supported under the M16.**

Furthermore, beyond the outputs associated with the measures implemented, data on the outcomes should be available. Hence, **monitoring by Member States on the effects of water-relevant instruments and measures on farming practices must be improved. More generally, when data on farming practices are monitored at the EU level (e.g. FSS, LUCAS, etc.), the data collection period must be carried out at the end of each programming period, so as to provide updated data available for the evaluation of the policy.** Accurate data on the different inputs use by farm types and their change over time would be very useful in assessing the degree of intensity of cultivation practices and their corresponding pressures on water.

Aside from the issue of accessing updated data coherent with the programming period assessed, it is important to provide the evaluators with comparable data scales. Hence, to assess the contribution of the CAP instruments and measures to the EU water-related objectives, **it is necessary to collect data at the scale of the water management unit, i.e. the river basin district. Data on measures outcomes, farming practices and agriculture pressures should thus be available at RBD and/or at NUTS 2 level.**

The WISE database offers data reported by Member States during their RBMP. However, the data available were compiled to comply with reporting requirements under the WFD and does not allow for clear identification of the number of waterbodies failing to achieve good water status because of



agricultural pressures. **It would be useful to request Member States to report the number of waterbodies failing to achieve good status because of agricultural pressures and to make the reporting period under the RBMP coincide with the ending of the CAP programming period.**

The FADN does not always make it possible to identify the beneficiaries of a single instrument or measures. For instance, beneficiaries of M10 are merged with those of M14. It thus not possible **to make sound analysis and identify potential correlation between the types of farms, the support perceived, and the practices implemented. The FADN data should be improved accordingly.**

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All over the European Union there are hundreds of Europe Direct information centres. You can find the address of the centre nearest you at: [https://europa.eu/european-union/contact\\_en](https://europa.eu/european-union/contact_en)

### **On the phone or by email**

Europe Direct is a service that answers your questions about the European Union. You can contact this service: – by freephone: 00 800 6 7 8 9 10 11 (certain operators may charge for these calls), – at the following standard number: +32 22999696, or – by email via: [https://europa.eu/european-union/contact\\_en](https://europa.eu/european-union/contact_en)

## **FINDING INFORMATION ABOUT THE EU**

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### **EU law and related documents**

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### **Open data from the EU**

The EU Open Data Portal (<http://data.europa.eu/euodp/en>) provides access to datasets from the EU. Data can be downloaded and reused for free, for both commercial and non-commercial purposes.



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