LIFE14 CCA/GR/000389 - AgroClimaWater
Promoting water efficiency and supporting the shift towards a climate resilient agriculture in Mediterranean countries

Deliverable A2.2: Agricultural Water Management System (AWMS) Implementation Guidelines

Action A2: Water Resilient Agriculture by means of the EWS standard

Action:	A2
Release:	Version 1
Action Responsible:	RODAXAGRO
Contribution to action's implementation:	LRI, HYETOS, UNIBAS, IOTSP

OCTOBER 2016

Project LIFE14 ENV/GR/000389–AgroClimaWater is implemented with the contribution of the LIFE Programme of the European Union and project's partner scheme

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Terminology / Abbreviations

Term	Description
ACW	Activity Completion Worksheet
AWMS	Agricultural Water Management System
BMPs	Best Management Practices
CG	Catchment group
e.g. / i.e.	For example
EC	European Commission
etc.	et cetera
EU	European Union
EWP	European Water Partnership
F.OR.	Farmers' Organization
G.A.P.	Good Agricultural Practice
HCVAs	High Conservation Value Areas
ICS	Internal Control System
m	Meter
m3	Cubic meters
MS	Multisite
N/A	Not available
OJ	Official Journal
PPPs	Plant Protection Products
RB	Responsible for River Basin's Committee
Reg.	Regulation
RL	Responsible for Legal matters
TEEB	The Economics of Ecosystems and Biodiversity
v	Version
WMAS	Water Management Adaptation Strategy
WMS	Water Management System
WS	Water Steward
WSI	Water Stress Index

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INTRODUCTION

The standard EWS produced by the European Water Partnership (EWP) is a tool for the improvement of water management in a variety of sectors, ranging from industry to agriculture. The implementation of such a tool could be especially helpful in areas threatened by climate change and its implications on water economy.

The standard is based on three technical principles, i.e. a) on water abstraction, b) on water quality and c) on High Conservation Value areas, outlining the route to be followed so as to detail specific requirements, relevant for each area and type of activity of the water users.

Each of the three principles starts with analysis of the current situation, followed by a risk analysis, to conclude with specific requirements in the form of action to be taken to prevent or mitigate the risk. The latter are then incorporated in the overall strategy of the company.

In agriculture, the effective implementation of EWS standard has to be coordinated by an organization who will take up the responsibility to mobilize the required resources. In order to be effective, it should be able to influence the majority of water users of the given activities in its area of responsibility. For example, a Farmers' Organization (F.OR.) or a municipal service can act in this way.

The fourth principle of the standard provides the system requirements needed for establishing a "**W**ater **M**anagement **S**ystem" (WMS or, for implementation in **A**griculture, **AWMS**) in governance terms. Using this system as a tool, the organization e.g. a F.OR, can elaborate on the three principles of the standard and then develop its own **W**ater **M**anagement **A**daptation **S**trategy (**WMAS**).

All requirements of EWS are included in the latest version of the document: **EWS Standard**. Presently, this is v4.8 issued **in** Dec 2012.

In case that the F.OR. has implemented the standard successfully and feels ready to proceed for a EWS certification, the following document has also to be used for setting up in a proper way the Internal Control System (ICS) required for the certification: **Guideline document for EWS Multi site and Catchment group scheme implementation**, (abbreviated as **EWS MS&CG Scheme Guideline**) issued in June 2016**.**

To facilitate F.ORs in this, reference is made in the present document to the relevant clause of the Guideline in **bold**, preceded by the letter G (e.g. **G1.7**) where appropriate.

In the context of the LIFE14 CCA/GR/000389AgroClimaWaterproject the three participating organizations Assofruit, KEDHP in Platanias and Mirabello Union are technically supported by a group of special scientists and experts.

1. GUIDELINE THROUGH THE EWS STANDARD

Note 1: The present guideline is designed for any organization in crop agriculture to start implementing the requirements of the standard. In this respect, it follows a time-path, instead of the value-path that the standard follows. To avoid confusion, the actions that are suggested here, bear in parenthesis the code number of the requirement (indicator).

Note 2: A series of forms of a quality system is suggested to be customized and filled in & signed. This is not necessary, if they are already covered by adequate procedures already in place by the organization. Form templates are compiled in APPENDIX I.

Specific meaning for agriculture of some of the terms used:

Source: The -licensed- abstraction point from a water body. The latter term -sometimes also named "source" in the standard- refers to the water available to the whole basin.

Water Steward: A person (role) within the organization assigned with everything that has to do with the EWS Standard, accountable for its proper implementation.

Geographic boundary of the scope of implementation of EWS by an organization: The perimeter that encompasses within it the basin (s) for which the organization accepts responsibility to manage water issues directly or indirectly.

STEPS for an Organization to start implementing the EWS as part of its policy

Step 1: Define your policy, taking account the level of control you have over the water use in the geographical scope you have determined in the basin, i.e. whether you assigned the task of decision making and implementing, or just a service provider-consultancy role. In the latter case, your policy must be balanced with your business expectations (see 4.7.1 and step 3). Make sure that organization's policy on water its scope and objectives are well communicated and understood within the organization.

Step 1 in sort: Be sure you have defined as clearly as possible where and how far you wish & can go.

Step 2: Assign responsibilities with regard to water.

Complete **Form XXX-1**[1] (in APPENDIX I) is used to assign the tasks below to different people within your organization, or multi-tasking may be preferred. The tasks are as follows:

- Person responsible for keeping up with legislation about water (4.1.1). This person, hereafter referred to as 'RL' will need to qualify for following up legislation to identify the points that are relevant with the organization's water management strategy. Also, own and implement the Procedure Form XXX-PL (in APPENDIX I) for monitoring the legal aspects, and to record this monitoring in Form XXX-L (in APPENDIX I),
- Person hereafter **'RB'** to be in contact with River Basin Committee, and its activities (4.5.1).
- Person in charge who ensures the implementation of the organization's Water-resources Management Strategy (4.8.1-2).This person will have the role of Water Steward, for the organization, hereafter **'WS'**. In this capacity, WS will be responsible for the quality system of the organization as regards water, including data collection, form filling etc. The first assignment for the

[1] XXX is to be replaced by a 4-letter acronym of each organization, e.g. META for Metapontino, as it is the case for all the sample forms presented in this Guideline document.

WS is to obtain the EWS standard and the related documents, study carefully and assume responsibility for its implementation.

- In case of multitasking, the assignment Form XXX-1 (in APPENDIX I) will state clearly that the roles of 'RL' and 'RB' are encompassed in the role of WS. So, everything that follows in this Guideline is for the WS to attend and to report to the management of the organization.

Step 2 in sort: Management assigns responsibilities for water in the organization

Step 3: (Applicable only in instances where not all water related facilities are under your direct control):

If the implementation of your water policy depends upon the free choices of others, like in the case of a Farmers' Organization, you have to ensure that the farmers share your policy and wish to undertake any tasks you assign to them, *inter alia* to provide data of good quality and complete and to assist you to satisfy the EWS standard in all its steps. Care should be given to be very clear about the expectations of farmers, e.g. about being certified for EWS. Thus, it is crucially important before signing the respective contract, to give to the farmers (in session and / or privately, if needed) adequate training on all the aspects of EWS. Please ensure that there is no registered farmer who has not signed this training record.

Form XXX-0 (in APPENDIX I) is a template of such a contract. Please take account of some details, e.g. if the farmer registers all his crops and parcels -encompassed in the boundary you defined as your scope in your policy -or only some of them. In the latter case justification has to be provided for the exemptions.

Step 3 in sort: Train, contract and register farmers and their water related facilities

Step 4: Preparation for addressing the EWS Principles (Optional).

Before you start addressing in detail the technical principles and criteria of the standard, you may need to get a first idea how far, or how close the organization is, and -based on that- to decide on the resources you might need, beyond the person you assigned as a Water Steward.

Forms AWMS 1, 2 and 3 (available at Deliverable A2.1: Final AWMS Forms, after the evaluation of training farmers and FORs in data collection and www.lifeagroclimawater.eu/en/Default.asp) may help you to collect historic e.g. for the last 5 years, and other data, by gathering generic information on the area, and by interviewing the participating farmers. Bear in mind though, that people memory is not a document, thus past information is not always verifiable.

Step 4 in sort: Use form AWMS 1 to collect historic data to the largest possible extent.

Step 5: Addressing the EWS Principles

2. 1ST PRINCIPLE: ACHIEVE/MAINTAIN SUSTAINABLE WATER ABSTRACTION IN TERMS OF WATER QUANTITY

Introduction

Sustainable means that abstraction is minimized as much as possible, so as to ensure that it will continue to meet the water demands of nature, of crops and of humans in the long run.

For irrigation, this can be achieved by determining carefully the sensitivity of the source and of crop water requirements, so as to provide it only when and as much as needed. Also, by proper maintenance of the irrigation networks, to eliminate leaks. Water is precious! Losses have to be nullified.

Which are the actions needed to meet the 1st principle?

Start by filling the first form AWMS 1, taking the criteria one by one:

Criterion 1.1: The total and the net water abstraction shall be quantified and monitored by source.

This is summarized on a monthly basis in Form XXX-1.1.2b and on a yearly basis in Form XXX-1.1.2c, in which abstraction is allocated per period (month).

1.1.1 All sources used for water abstraction are documented (documentation regularly updated).

Collect data to identify and map all the water sources available within the geographical scope defined by the organization. Fill in Form XXX-1.1.1 as best as you can, having considered the following issues: a) Investigate possible association of the near-the-borders-sources to other major sources of the neighboring river basins, b) Ensure that in your form, all the sources are filled-in and not only the ones related to the farmers registered in your organization for EWS. If the latter occurs, estimate how many sources of your in-scope-basin or sub-basin may be out of your control, and c) Include in your list sources that are -for any reason- currently inactive, but keep the potential to be re-

METAPONTINO			FORM META-1.1.1 LIST OF WATER SOURCES & ORIGINS WITHIN GEOGRAPHIC SCOP												v1 13.11.2016
Water body (Code)	Water Source (Code)	LOCATION	Coordinates	TYPE (see note 1)	OWNER Private (PRV) Public (PU)	LISENCE NUMBER	EXPIRY DATE	Maximum permissible abstraction rate (m3/y)	Mean water volume abstraction (m3/y)	Depth of abstraction (m)	Date of last maintenance	Mean energy consumption (kWh/m3)	Mean area irrigated yearly (Ha)	Volume used for Agriculture (m3)	Volume used for other uses (m3)
Sources: Pumping station (PS), Well (WL), Irrigation Network (IN), Open Channel (OC) **Origins**: Ground Water (GW), Lake (LK), River (RV)															
Water Steward						**Signature**						Completed for year yyyy dd/mm/yyyy			

activated. For each of the above dubious points you have to decide a policy on how to handle it (see **G2.1**).

1.1.2 The water volume abstracted from each source is quantified, monitored and reported (see also G3, G4.1 and G4.2).

- Establish a process, e.g. interviews, questionnaires etc., to obtain the data to be filled in the form XXX-1.1.2a per irrigation event by each water source. Data have to be filled in, and records to be collected from the farmers within a week from irrigation. If helpful, document this process as a standardized procedure.
- Establish a control procedure to ensure that the form is filled in accurately and regularly, e.g. every week or every month. If helpful, when proven effective, standardize this process and document it and/or the control results as above.
- Summarize the data of Form XXX-1.1.2a for all water sources on a yearly basis, to know how much water was abstracted and which periods. Produce a report using the Form XXX-1.1.2b, and report it for authorization by the management of the organization.

METAPONTINO		Parcel:		META-1.1.2a IRRIGATION RECORD / PARCEL / PER IRRIGATION EVENT										v1 13.11.2016
Water Source (Code)	Parcel (Code)	Date	Method	Flow (m3/Hr)	Duration (Hr)	Hydrometer indicator before	Hydrometer indicator after	Irrigation cost (€/m3) or…	Irrigation cost € / irr. event	Wages cost (€ /Irr. Event)	Farmer's own labour (Hr/Irr. Event)	Energy consumption (kWh/Irr. Event	Energy cost (€ /Irr. Event)	Estimated % lost
Farmer					Signature					Completed for year yyyy dd/mm/yyyy				

1.1.3 The water discharge[2] of the production is quantified according to the type of contribution:*

- *The organization as water steward is a "minor contributor" when discharged water accounts for less than40% of the water abstracted.*
- *The organization as water steward is a "major contributor" when discharged water accounts for more than 40% of the water abstracted.*

Agriculture, excluding flood irrigation, is by default a minor or no contributor at all, since water is not supposed to return to its source. In case of flood irrigation please consider carefully the proportion discharged.

- Except for flood irrigation, estimate the amount of irrigation water that was unused by the crop i.e. it was lost by run-off and/or by leaching. The farmer has to record this as percentage in Form XXX-1.1.2a per irrigation event and the water steward to summarize it in Form XXX-1.1.2b.
- In Form XXX-1.1.2c, the water steward summarizes and reports for review to the management of the organization the yearly abstraction for each source, allocated in the periods (months) when abstraction took place.

[2] Words marked with an * are explained in more details in EWS Glossary document (2013)

METAPONTINO	FORM META-1.1.2b RECORD OF ABSTRACTION PER MONTH										v1 13.11.2016			
Water Source (Code)	Month of abstraction for irrigation	Parcels irrigated (number)	Area irrigated in total (Ha)	Crops irrigated	Estimated % lost	Abstracted volume (m3)	Estimated volume of renewable freshwater resource	Percent of reserves abstracted monthly	Source is a minor contributor (Yes-No)	Source is a major contributor (Yes-No)	Maximum abstraction rate in m3 / month	Maximum abstraction rate in m3 / period	Maximum abstraction rate in m3 / year	Volume used for other uses (m3)
Water Steward					Signature					Completed for year yyyy dd/mm/yyyy				

METAPONTINO	FORM META-1.1.2c REPORT OF YEARLY WATER ABSTRACTION (m3)												v1 13.11.2016	
Water Source (Code)	J	F	M	A	M	J	J	A	S	O	N	D	TOTAL	Notes
Manager of Organization					Signature					Completed for year yyyy dd/mm/yyyy				

Criterion 1.2: Impact* of water abstraction and water discharge (quantity) shall be described and evaluated appropriate to the scale of the source, to the intensity of water management and to the uniqueness of the significantly affected sources.

1.2.1 All water sources are classified in terms of their sensitivity* according to one or more of the following criteria:

- *Abstractions from water bodies that are recognized by professionals to be particularly sensitive due to their relative size [in m3].*
- *Whether or not the source is designated as a protected area* (nationally and/or internationally) regardless the amount of abstraction.*
- *Groundwater is considered as sensitive source* per se.*

• In addition to the knowledge of sources from groundwater (therefore sensitive by default) to determine the sensitivity of each source against the first two criteria above, you need to seek official documentation per source, valid at the time of filling the form.

METAPONTINO	FORM META-1.2.2 SOURCE SENSITIVITY ASSESSMENT									v1 13.11.2016			
Water Source (Code)	Regulated or Permitted maximum abstraction (Yes/No)	Groundwater (Yes/No)	Recognized as sensitive due to its size (Yes/No)	Designated Protected Area (Yes/No)	Document for Regulated / Permitted Abstraction, for Recognition as Sensitive (ID & date)	Periods of Water Stress (Months)	Periods of high abstraction (Months)	Environmental impact	Socioeconomic impact	Water stresses (Yes / No)	Maximum abstraction rate (m3/m)	Minimum abstraction rate (m3/m)	Notes
Water Steward					Signature					Completed for year yyyy dd/mm/yyyy			

All relevant documentation (see column 6 in Form XXX-1.2.2. has to be kept in the dossier of the organization with the legal matters.

- Based on the information above, you can fill-in the first six columns of the Form XXX-1.2.2. If you have one or more "Yes" in columns 3, 4 and 5, then this source is linked to a sensitive water body. If not sensitive, no further analysis with regard to risk is necessary. You will just have to implement the Good Irrigation Practices when farmers will abstract water for irrigation from this source.

1.2.2 For each sensitive water source (as identified in 1.2.1) the water steward*:*

1) Defines suitable and relevant periods of water stress.*

2) Links periods of water stress to abstraction and discharge rates.

You start by filling in the available information in Form XXX-1.2.2. In order to find out the periods of water stress for a source you need to compare the abstracted water during that period (Form XXX-1.2c) with the volume of water available in the water body reserves for that source, taking also account of other associated sources. This information will only be available through the local water authorities, who may have already documented the water stress periods for each of the sources. Fill-in both pieces of information in columns 8 and 12 of Form XXX-1.2.2, as a first step.

1.2.3 The impact of abstraction and discharge is described (by source). This description includes:*

- *The impact* of abstraction and discharge is described (by source). This description includes:*

- Environmental *impact* (e.g. loss of wetlands, biodiversity, protected areas, reduction of environmental flow*, desertification, seawater intrusion, changes in river morphology, decline in groundwater level, etc.).*
- *Socio*-economic *impact (e.g. water shortage, interruptions of water supply, restrictions, imports, etc.) and the regional population potentially affected downstream by water abstraction and discharge (flooding).*

Impacts of abstraction and discharge cannot be defined at a water source level (water borehole, spring, well etc.) since water availability of the source is directly dependent on the water availability of the respective water body. Thus, impacts of abstraction and discharge can only be assessed on a water body level.

On the water body level, however, impacts of the abstraction and discharge from a single farm, or even a small group of farms are expected to be insignificant, since the irrigation water volume abstracted will be negligible compared to the annual water volumes transferred in and out the water body. The cumulative effect of irrigation water abstraction, however, cannot be disregarded since agriculture is a major water user globally, i.e. it can be assumed to contribute significantly to all impacts related to water availability reduction. Agriculture's total contribution to impacts on a water body could be assessed if total abstraction and discharge for all the users within the basin were known.

The latter, i.e. impacts on water bodies from total abstraction and discharge, have already been assessed in the frame of the respective river basin management plans so that the status of water bodies is identified. Thus, in order to assess impacts, the WS could seek for information on the quantitative status of the particular water body from the relevant local authority or the respective River Basin Management Plan (RBMP).

More in particular, in order to identify impacts on water quantity of water bodies located within a particular river basin based on the RBMPs, their status should be checked by considering:

- the quantitative status of underground water bodies in accordance with paragraph 2.1.2 of Annex V WFD. In particular, the quantitative status is classified as good when the conditions described on the following table are met (Annex V, WFD).
- the ecological status of surface water bodies and in particular the hydromorphological quality elements[3] of the water body should be considered.

<table>
<tr><th>Elements</th><th colspan="3">Good Status</th></tr>
<tr><td>Groundwater level</td><td colspan="3">The level of groundwater in the groundwater body is such that the available groundwater resource is not exceeded by the long-term annual average rate of abstraction. Accordingly, the level of groundwater is not subject to anthropogenic alterations such as would result in:
• failure to achieve the environmental objectives specified under Article 4 of WFD for associated surface waters.
• any significant diminution in the status of such waters,
• any significant damage to terrestrial ecosystems which depend directly on the groundwater body.
• and alterations to flow direction, resulting from level changes that may occur temporarily, or continuously in a spatially limited area, but such reversals do not cause saltwater or other intrusion, and do not indicate a sustained and clearly identified anthropogenically induced trend in flow direction likely to result in such intrusions.</td></tr>
<tr><td></td><td>High status</td><td>Good status</td><td>Moderate status</td></tr>
<tr><td>Hydrological regime</td><td>The quantity and dynamics of flow, and the resultant connection to ground-waters, reflect totally, or nearly totally, undisturbed conditions</td><td rowspan="2">Conditions consistent with the achievement of the values specified above for the biological quality elements.</td><td rowspan="2">Conditions consistent with the achievement of the values specified above for the biological quality elements.</td></tr>
<tr><td>River continuity</td><td>The continuity of the river is not disturbed by anthropogenic activities and allows undisturbed migration of aquatic organisms and sediment transport</td></tr>
</table>

[3] **Hydromorhological status** is related with the hydrological regime of a river (quantity and dynamics of water flow, connection to groundwater bodies), River continuity and morphological conditions (river depth and width variation, structure and substrate of the river bed, structure of the riparian zone).

Morphological conditions	Channel patterns, width and depth variations, flow velocities, substrate conditions and both the structure and condition of the riparian zones correspond totally or nearly totally to undisturbed conditions.		

In case that the quantitative status of a groundwater body is classified as good, or the ecological status, and in particular the hydromorphological quality elements of a surface water body, is classified as high or good, no significant environmental and/ or socioeconomic impacts have been identified on the water body.
If the water body is classified in a status lower than good, then impacts on the water body have been identified and the contribution of agriculture should be estimated, if possible. If the latter is not possible, it is assumed that agriculture's contribution is significant. To assess the impact that an individual farm has on the status of the respective water body, the actual annual water volume abstracted for irrigation purposes in the farm is compared to the maximum annual abstraction volume allowed in the respective water permit. In case of over – abstraction, the farm is considered to have impacts regarding water availability (quantity).
Last, when a water body is classified in an unknown status, i.e. lack of data to perform an impact assessment during river basin management planning by the competent authorities. Should this be the case, updated information should be requested by the competent authority. If data is still not available, then the worst-case scenario is assumed, i.e. the status of the water body is considered to be lower than good and the same procedure as above is followed.
The WS summarizes the above information in Form XXX-1.2.3a.

METAPONTINO	FORM META-1.2.3a RECORD OF ABSTRACTION / WATER SOURCE / IRRIGATION EVENT						v1 13.11.2016
Water Source (Code)	Code of Water Body	Type of Water Body	Classification of underground water body status in terms of quantity	Ecological status of surface water body	Over-abstraction according to the legal permit Yes / No	Contribution to abstraction (%)	Notes
Water Steward		**Signature**			Completed for year yyyy dd/mm/yyyy		

Impacts identified for each water body in the relevant river basin management plan, can be summarized on Form XXX-1.2.3b. The form can also include information acquired by interviews with the competent authority, or expert opinions. Any further information should be provided on the last column.

METAPONTINO	FORM META-1.2.3b IMPACTS OF WATER ABSTRACTION & DISCHARGE / WATER BODY		v1 13.11.2016
Impacts on		Y/N	Comments
Water source			
Decline of groundwater level			
Reduction of stream/river flow			
Limitation on the provision of water (irrigation networks)			
Salinization of coastal aquifers			
Other (describe)			
Environment			
Losses of wetlands			
Reduction of flora and fauna			
Soil erosion and desertification			
Landslides			
Other (describe)			
Society			
Water shortage			
Conflicts between users			
Reduction of productivity			
Other (describe)			
Notes			
Water Steward	**Signature**	Completed for year yyyy dd/mm/yyyy	

1.2.4 In case a meaningful maximum abstraction rate is NOT defined by legal authorities and NOT included in an official abstraction permit, the water steward* has to:*

1) Define the water stress level of the referring sources (e.g. by calculating the Water Stress Index WSI). If the source is classified as water stressed, define the sensitive periods* of the source and calculate a maximum abstraction rate per period.*

2) Define the contribution to the joint abstraction of the associated source as follows:

- *If minor abstractor* (water withdrawals account for an average of less than 5% of the renewable freshwater resource) define a maximum abstraction rate.*
- *If major abstractor* (water withdrawals account for an average of 5% or more of the renewable freshwater resources) then define sensitive periods per source and define a maximum abstraction rate per period.*

Maximum abstraction rates are defined by the relevant legal authorities and included in the legal water permit for every source utilized by a farmer or other user for the abstraction of water. Thus, in the general case and assuming that every farmer participating in the AWMS conforms to applicable law, no further action will be required by the WS.

If this is not the case, then the WS should ask farmers to comply with the national law and proceed with the permit issuing. In the meanwhile, the WS must set abstraction limits for each water source illegally operating according to the national law (e.g. Decision 146896/27.10.2014 (OJ B 2878) for Greece)

Criterion 1.3: Actions taken to improve water efficiency, reduce water losses and mitigate detected and potential impacts of water abstraction shall be described and implemented. All actions should be integrated in the Water Management Strategy (Criteria 4.8).

In addition to taking measures to restrict abstraction to a limit that will avoid the risk to the environment, you have to take generic 'good irrigation practice' measures. Establishment of Good Irrigation Practice should be the cornerstone of your Water

Management Strategy. So, training has to be scheduled for that, no matter for other findings with regard to risk for water scarcity.

1.3.1 Action is taken to mitigate actual and potential impacts caused by water abstraction and discharge (as defined in indicator 1.2.3).*

Since water quantity is of importance here, action needs to be taken in order to rationalize water abstraction, reduce water losses and relieve water stress applied to water bodies by agricultural activities.

Taking into account the status of the respective water bodies and impacts identified in indicator 1.2.3 the following actions can be taken:

- In case the quantitative status of a groundwater body is classified as good, or the ecological status (and in particular the hydromorphological quality elements) of a surface water body is classified as high or good, no impacts have been identified and thus no action is imperative.
- If the water body (both groundwater and surface waters) is classified in a status lower than good, then impacts on the water body have been identified. In this case the competent authorities should have established a programme of measures and/ or restrictions. The WS should seek relevant information and propose actions to rationalize water abstraction and reduce water losses that contribute to the achievement of the programme's objectives.
- If the water body is classified as having an unknown status and impacts cannot be assessed, then status is assumed lower than good and the WS should propose suitable action to rationalize water abstraction and reduce water losses.

Taking into account the status of the respective water bodies and impacts identified in indicator 1.2.3, action can be taken as shown on table 1.

Table 1: Mitigation of abstraction impacts

Status	Surface waters	Groundwater
Classification	Ecological Status	Quantitative status
High	No action is imperative	N/A
Good	No action is imperative	No action is imperative
Lower than good (Moderate, Poor, Bad)	Action is required on the field. Good Agricultural Practices should be applied grouped for the farm characteristics	Action is taken to minimize impacts from abstraction and increase water efficiency on the field
Unknown	Status considered as below good and action is taken as above	Status considered as poor and action is taken as above

As a minimum requirement, all farmers should conform to the requirements of their legal water permits. The WS needs to establish control measures so that water abstraction is within the limits of the respective water permit. Moreover, the WS makes sure that irrigation water is applied according to the instructions and that dosage does not exceed the maximum allowed daily abstraction rate defined in the permit. Should this be the case, the weekly defined irrigation water volume needs to be applied in more than one dosages. The latter, except for assuring conformance with legal requirement, will help relieve stress from the respective water body.

Given that water lost in agriculture does rarely return to the same source and thus is not in the general case readily available to other users, a strategy is needed to increase water efficiency on the field and minimize water losses. The strategy will be based on Good Agricultural Practices to be applied by all farmers.
Taking into account the above, the respective water body status and impacts identified, the agricultural practices applied so far on the field, as well as water efficiency on the field the water steward will decide whether the proposal of a farm specific action plan is required. Form XXX-1.3.1 can be utilized for this purpose.

METAPONTINO		FORM META-1.3.1 ACTIONS TO MITIGATE THE IMPACTS							v1 13.11.2016		
Parcel code	Water source	water body status	Agricultural practices applied					Production (Kg/ha)	Identified impacts (Y/N)	Evaluation of water efficiency	Proposal of a specific plan (Y/N)
			Organic or Conventional	Irrigation method	Soil cultivation method	Weed management method	Pruning				
Water Steward					Signature				Completed for year yyyy dd/mm/yyyy		

Farm specific action plans will detail action to be taken on the field level for every farm participating in the AWMS, based on the agricultural practices originally applied by the farmers, as described in the 1st AWMS form. Actions to increase water efficiency on the field can include maintenance / repair of the irrigation network, enhancing water holding capacity of the soil, minimizing evapotranspiration losses etc. Any positive result in this direction will also help mitigate actual and potential impacts identified and help prepare farmers adapt to climate change, which in the Mediterranean is linked to decreased water availability.

1.3.2 Only applicable when one of the sources of water is an external water supplier: The water user evaluates the performance of its external water supplier (WS) in terms of Sustainable Water Management.

- *Indication is given whether the volume of water supply, provided by a water treatment plant, is more than 50% of the water stewards' total water use [in m3].*

Proper evaluation is not applicable if there is no choice for water providers (at least for Greece).
In the case of choice availability, make sure to include in your purchasing contract, clauses obliging your selected provider to provide all the data you need for his evaluation, as well as his commitment to be open and cooperate for any verification activities by you or your CB, that will enable you to have a solid base for the provider's evaluation.
In absence of a binding contract, you have to make every effort to collect from the external provider the information you need, and devise a means to verify it as much as possible.

3. 2ND PRINCIPLE: ENSURE THE ACHIEVEMENT AND MAINTENANCE OF GOOD WATER STATUS IN TERMS OF CHEMICAL QUALITY AND BIOLOGICAL ELEMENTS

***Explanation**: Sustainable Water Management shall ensure the achievement and maintenance of the good water status, meeting legal and/or agreed quality standards in all affected river basins*. Therefore, the quality of all effluents*shall be evaluated by the water manager.*

Introduction

It is not only a matter of water quantity, but also of quality! Water has to be kept free of contaminants that could 'poison' it. The effect of such a 'poisoning' is the disturbance of populations of water-creatures dwelling the natural ecosystem.

Unlike some industries or animal husbandry, crop agricultural activity under normal operation does not produce chemical discharges/effluents by default to the water bodies, in the sense that chemicals as well as water, when used under good agricultural practice (G.A.P.) are meant to stay where applied. So, the driving assumption in dealing with the 2nd EWS principle is that:

In crop agriculture, "effluents" may result only as failure of Good Agricultural Practice (lost agrochemicals bear cost to the farmer too!) or by accident.

Failure of G.A.P. can be manifested in the following ways:

i. Use of excessive amounts of agrochemicals, especially fertilizers, which remain unused and can be moved away by water run-off, leaching or even erosion. As destination, this can be water bodies (though not necessarily 'returning to the source'), this is the closest to the 'discharge/effluents context').
ii. Inadvertently allowing the spray cloud to drift away to water surfaces.
iii. Improper disposal of emptied agrochemical containers to ditches or water channels.
iv. Improper disposal of washings of the spraying equipment to water.

Accidents may occur by:

i. Careless transportation of agrochemicals.
ii. Flood or fire extinguishment with water in an agrochemical store.

The effect of the driving assumption above is that in the part of the guideline that follows, we will focus only on the preventive measures (precautionary principle) to be included in G.A.P. and not on the concept of effluents, their monitoring and their treatment. In other words, presence of effluents should not occur; if it does, nothing can be done, as effluents are not under the control of the organization.

Before starting to deal with water quality in detail, you may wish to have an idea of how things have been historically. To do this, you can go back to step 4 in AWMS 1 Form which there is a number of questions on agrochemicals use.

Criterion 2.1: Total inputs on site shall be disclosed and the total effluent* quality shall be determined, monitored and documented.

2.1.1 There is a complete and up-to-date inventory of all applied substances, indicating the frequency and amount/volume applied. Substances are classified according to following schemes:

- Classified as hazardous* to the Aquatic Environment (H-phrases).
- Considered a main pollutant* according to the EC Water Framework Directive (2000/60/EC).
- Considered a priority substance* or specific pollutant* in river basin according to the EC Water Framework Directive (2000/60/EC).
- Considered as pollutant by the local/national legislation.

Chemical contaminants escaping from crops are mainly unused nutrients and Plant Protection Products. Fertilizers do not fall within the schemes above. As for PPPs, they are in both Italy and Greece, as in the rest of the EU regulated as chemicals and registered as PPPs, in the context of the Precautionary Principle[4]. According to the CLP Regulation (1272/2008) information on the basic properties of the active ingredients and the rest of the chemicals present in the formulation is mandatory to appear on the labels of all chemicals. For the aquatic environment, this label includes a hazard statement, e.g. H411, the related pictogram, and precautionary statements, e.g. P391.

Table 2: Hazard phrases and pictograms for chemicals

This pictogram (GS09) denotes risk for the environment, aquatic included.				--	--
Signal word	Warning	Warning	--	--	--
Hazard statements	H400: Very toxic to aquatic life	H410: Very toxic to aquatic life with long lasting effects	H411Toxic to aquatic life with long lasting effects	H412: Harmful to aquatic life with long lasting effects	H413: May cause long lasting harmful effects to aquatic life
Precautionary Statement Prevention	P273	P273	P273	P273	P273
Precautionary Statement Response	P391	P391	--	--	--
Precautionary Statement Storage	--	--	--	--	--
Precautionary Statement Disposal	P501	P501	P501	P501	P501

[4] The precautionary principle is detailed in Article 191 of the Treaty on the Functioning of the European Union (EU). It aims at ensuring a higher level of environmental protection through preventative decision-taking in the case of risk.

P273 Avoid release to the environment, **P391**: Collect spillage & **P501**: Dispose of contents/containers to…..

- For PPPs (agricultural use of chemicals) according to Reg. 1107/2009 which enforces the Precautionary Principle, a thorough risk assessment by highly specialized officials precedes the approval of their label and their registration. This formal risk assessment process is based on the above properties, but also takes account of the use pattern, the application regime and the consequent exposure of local environment under the prescribed on the label G.A.P (Good Agricultural Practice). So, all a farmer has to do is to follow this G.A.P.
- A farmer committed to implement the EWS standard has to be knowledgeable and alert to look carefully for the above pictogram and P phrases on the labels of the PPPs he uses. There is no problem if there are, since the registration of the PPP means that in spite of the intrinsic properties (hazard), of substances in the PPP the exposure of environment after its proper use will, is not expected to lead to undesired effects (risk). The presence of the above information on the PPP label, has to motivate the farmer to look carefully for specific phrases on it, for example, **SPe3** "k*eep a buffer zone of e.g. 30m from adjacent waterways*" or similar. These phrases may be present even in absence of the pictogram and the P phrases mentioned above. They are PPP specific and should not be over looked. Also, a generic phrase of precaution, always valid, is **SP1.** *Do not contaminate water with the product or its container.*
- Thus, the organization has to plan specific training on the regulated use of PPPs and the special precautions needed, as well as to set up a control mechanism for the control of implementation of such special precautions by the registered farmers.
- In order to meet Criterion 2.1 a data collection system is needed. After a quick training, farmers will be in position to record the use of fertilizers and PPPs, by filling-in the forms XXX-2.1.1a1 & XXX-2.1.2a2 for fertilizers and PPPs respectively. To reduce uncertainty, there forms should be filled-in, shortly after the product application, i.e. within a fortnight.
- By collecting the completed forms, the Water Steward of the organization will have to consider if the activity reflected by the data is exhaustive, i.e. it covers all farmers and parcels within the basin, or not. In the latter case, especially if the collected data are few as percentage of the 'total' activity, he will have to consider if it could be a representative 'sample' for all the basin. If not, then he will have to consider to propose to the organization a reshaping of the scope of its objectives. This is important, as the monitoring measurements by the water authority may have a different scope than the organization.

METAPONTINO				FORM META-2.1.1a1 FERTILIZATION RECORD											v1 13.11.2016
Date of Application	Total amount of Fertilizers (Kg/Parcel)	Total amount of manure (Kg/Parcel)	Fertilizer type	Common name / Trade name	Fertilizer producer	N (%)	P (%)	K (%)	B (%)	Method of Application (Manual / Mechanical)	Application Local / Broadcast	Fertilizer cost (€/Parcel)	Manure cost (€/Parcel)	Wages cost for application	Farmer's time for Application (Hr/Parcel)
Farmer					Signature							Completed for year yyyy dd/mm/yyyy			

METAPONTINO				FORM META-2.1.1a2 PPP APPLICATION RECORD										v1 13.11.2016
Date of Application	Total amount of PPP Formulation (Kg-Lit/Parcel)	Total spray volume (Lit/Parcel)	PPP Trade name	PPP Registration number	GHS and P numbers on the label	Method of Application Knapsack, Static, Born, Trailed)	Application direction Up-Canopy, Down-Weeds)	Application pressure (Bars)	Number of nozzles	Application Duration (Hr/ Parcel)	PPP cost (€/Parcel)	Application by subcontractor cost (€/Parcel)	Wages cost for application (€/Parc	Farmer's time for Application (Hr/Parcel)
Farmer					Signature						Completed for year yyyy dd/mm/yyyy			

- After having gathered all the application records, the Water Steward has to summarize the total agrochemical inputs per parcel, expressed on hectare basis. Forms XXX-2.1.1b is suitable to gather this information.

METAPONTINO		FORM META-2.1.1b POLLUTANTS INVENTORY / PARCEL														v1 13.11.2016
Parcel code:				Kg / Ha / month												
TYPE OF POLLUTANT	Hazard Statement (Number only)	"P" and other phrases on label	Kg / Ha / Y	J	F	M	A	M	J	J	A	S	O	N	D	
N																
P																
K																
PPP-1																
PPP-2																
PPP-3																
PPP-n																
Water Steward				Signature							Completed for year yyyy dd/mm/yyyy					

2.1.2 For each of the potentially polluting substances, the type of pollution (i.e. point of diffuse pollution*) is described and potential destinations* are identified.*

- Would pollution unduly take place, it will always be diffuse pollution, following the route of water either infiltrating to the deeper ground, or downhill with the slope. In principle, it will not be substance dependent, unless one takes account of properties like water solubility, half-life etc.
- In Form XXX-2.1.2, the Water Steward summarizes the potential pollutants that have been applied to all the registered parcels, during all the applications on an annual basis and reports it to the organization management for review.

METAPONTINO	FORM META-2.1.2 CUMULATIVE POLLUTANTS INVENTORY													v1 13.11.2016
Kg / Ha / year														
Parcel (Code)	N	P	K	B	PPP-1	PPP-2	PPP-3	PPP-4	PPP-5	PPP-6	PPP-7	PPP-8	PPP-9	PPP-10	PPP-11
Manager of Organization							Signature				Completed for year yyyy dd/mm/yyyy				

- The organization has to map the points of origin of the pollutants, i.e. the parcels with the crops, and the most probable destinations according to the pedoclimatic properties of the area.

2.1.3 Only applicable when recycled, re-use, rain-harvested, desalinated or grey water is used: Analyze, monitor and report on the quality (e.g. nutrient concentration, salinity, pathogens, etc.) of water.

Such water is not used in field agriculture, but only in glasshouse hydroponics in Greece, so here it is N/A.

2.1.4 The quality of the effluent discharged by the production site is analysed, monitored and reported. Only when required: Statutory monitoring reports* are completed.*

Not applicable, as there is not any designated effluent to be analyzed. As mentioned before, in agriculture, "effluents" may result only as failure of Good Agricultural Practice (lost agrochemicals cost to the farmer too) or by accident. Generally speaking, however, main pollutants and priority substances can be identified in surface water bodies attributed to agricultural activities, via drift from spraying, surface run – off and / or leaching.

2.1.5 Main pollutants and priority substances* (as identified in 2.1.1) in the effluent are identified and, if possible, quantified.*

Pollutants presence depends on the following factors:

- The deviation of Good Agricultural Practice, for both fertilizers (leaching and run-off of nutrients) and for PPPs (washing or disposing of empty containers, drift). As such deviations are mostly unpredictable (otherwise they would have been under control), there is no way to be quantified, but only as a guess work of local experts from whom the Water Steward can ask for assistance. Form XXX-2.1.6 for fertilizers below, could help in this direction.
- on the potential of the parcel's soil for leaching and run-off. For this, please consult the document "Risk Assessment Methodology" prepared by the partner LRI, to help the Water Steward to calculate the risk.

2.1.6 The eutrophication potential is identified and evaluated.*

- The amount potentially lost, multiplied by the conversion factor, can -in combination with the results of the "Risk Assessment Methodology" show which is the eutrophication risk from the fertilizer-related emissions.

METAPONTINO	FORM META 2.1.6-EUTROPHICATION POTENTIAL			v1 13.11.2016
Eutrophication potential of farming	Amount of potential loss	Conversion factor	Eutrophication potential (PO4-eq)	Notes
Nox (to air)		0,13		
Total N (to water)		0,42		
Total P (to water)		3,07		
NH3		0,45		
Water Steward	**Signature**		Completed for year yyyy dd/mm/yyyy	

Criterion 2.2: Impact on destinations* that are affected by the production sites' effluents shall be identified and described. Measures shall be set in place to mitigate these impacts*.

2.2.1 High risk areas* are identified at the production site and indicated on maps.

See 2.1.2 about this map. All registered parcels are included as it is not predictable when a deviation from G.A.P. could occur.

2.2.2 All destinations* which are potentially affected by the production sites' pollutants (e.g. by discharging, leaching* or drainage* water, or by erosion* and run-off*) are compiled in a list.

See 1.1.1 about this map and use Form XXX-1.2.2 for each point on the map.

2.2.3 All potential destinations (as defined in 2.2.2.) are classified in terms of their sensitivity according to one or more of the following criteria:

- *Recognized by professionals to be particularly sensitive due to their relative size, function, or status as a rare, threatened, or endangered system (or support endangered plant or animal species).*
- *Designated as a protected area* or vulnerable area* (nationally and/or internationally).*
- *Groundwater is considered as sensitive per se.*

Form XXX-2.2.1,2 below, can be used for classification, adjusted as follows:

METAPONTINO		FORM META-2.2.1,2 SOURCE POLLLUTION SENSITIVITY ASSESSMENT									v1 13.11.2016
Water source (Code)	Groundwater (Yes/No)	Recognised as sensitive due to its relative size, function or status as a rare, threatened or endagered system (or support endanger plant or animal species)(Yes/No)	Designated as Protected Area* or Vulnerable area* (Yes/No)	Documents for regulated/permitted abstraction, for recognition of sensitivity (& Dated)	Is it for drikable water? (Yes/No)	Is it used for irrigation? (Yes / No)	Is it used for swimming? (Yes / No)	Periods of potential water pollution (Month	Peiods of high abstraction (Months)	Environmental impact	Socioeconomic impact
Water Steward					Signature				Completed for year yyyy dd/mm/yyyy		

2.2.4 The impact of the discharge is assessed and described by destination. This description includes:

- *Biodiversity value of the destination (e.g. species diversity and endemism, number of protected species).*
- *Environmental impact* from pollutants to water (e.g. biodiversity, protected areas, etc.).*
- *Socio-economic impact.*
- *Regional population (negatively) affected down-stream by effluent water.*

Impacts imposed to potential destinations by an individual farm are difficult to quantify (no effluent or discharge in the traditional sense, diffuse source of pollution, infiltration and surface run-off losses that can only be experimentally measured). But even if quantification was possible, impacts imposed from water losses carrying nutrients and

other potential pollutants from a single farm would be negligible compared to the water capacity of an aquifer or the water volumes transferred through a surface water body (river).

However, agriculture in total has broadly known impacts, relating mostly to nitrates pollution, eutrophication, as well as the identification of pesticides and other agrochemicals' active ingredients and pollutants in surface waters and groundwater bodies. It is the cumulative effect of agricultural activities implemented in many or most farms that imposes impacts on potential destinations.

For the above reasons, the impact assessment of agricultural activities in water quality of potential destinations will be performed based on available data on the status of the water bodies identified as potential destinations in criterion 2.2.3. Information regarding the status of water bodies is included in the river basin management plans (Directive 2000/60/EC). In addition, the WS should establish a communication channel with the local River Basin authorities, in order to receive regular updates on the quality of the surrounding water bodies.

Surface water bodies

Based on Directive 2000/60/EC, the total status of surface water bodies depends on two parameters:

1) Ecological Status
2) Chemical Status

Ecological Status: The quality elements examined for the classification of a river's ecological status include biological elements, hydromorphological elements and chemical and physico - chemical elements supporting the biological elements. Based on the above parameters, the ecological status of a surface water body, in the case examined river, can be classified as:

- **High status:** corresponds totally or nearly totally to undisturbed conditions. No impacts of anthropogenic nature are identified.
- **Good status:** there are some changes in biological elements due to anthropogenic activities, slightly different from undisturbed conditions. Impacts of anthropogenic nature are considered low.
- **Moderate status:** there are moderate changes in biological elements from the typical corresponding to undisturbed conditions. There are moderate impacts form anthropogenic activities affecting biological, physicochemical and hydromorphological elements.
- **Poor status:** there are major alterations in the biological quality elements from the typical corresponding to undisturbed conditions. There are significant impacts form anthropogenic activities affecting biological, physicochemical and hydromorphological elements.
- **Bad status:** there are severe alterations to the values of the biological quality elements and large portions of the relevant biological communities under undisturbed conditions are absent. There are severe impacts form anthropogenic activities affecting biological, physicochemical and hydromorphological elements.

In the case that the ecological status of a water body is classified as moderate, poor or bad, types in which anthropogenic activities have imposed from moderate to severe impacts; the WS should seek more information regarding the specific characteristics of the water bodies that have led to such classification. Such information may be found in the Annexes of the River Basin Management Plans and/ or can be requested by the relevant authorities. Last, but not least, when data are missing, the status of a surface

water body might have been classified us unknown. In that case impacts from anthropogenic activities are also unknown and information from the relevant authorities should be requested.

Chemical Status: The chemical status of the surface water bodies is classified based on the environmental quality standards for priority substances and other hazardous to the environment substances set on national level by EU Member States in accordance to WFD (2000/60/EK). Where a body of water achieves compliance with all the environmental quality standards it shall be recorded as achieving good chemical status. If not, the body shall be recorded as failing to achieve good chemical status.

Based on the above, the chemical status of a surface water body can be either:

- **Good**: no impacts due to anthropogenic activities have been identified
- **Failing**: impacts due to anthropogenic activities have been identified, and
- **Unknown**: no data are available.

In case that the chemical status of the water body under examination is classified as **failing or unknown**, the WS should seek more information from the relevant authorities in order to identify potential impacts induced by agricultural activities.

Groundwater bodies

As far as groundwater bodies are concerned, 'Good groundwater status' means the status achieved by a groundwater body when both its quantitative status and its chemical status are at least 'good'. Regarding chemical status, based on the WFD the chemical status of a groundwater body can be classified as good or poor.

In case that the chemical status of the groundwater body in question is classified as good, no impact from anthropogenic activities is identified. If the status of the water body is classified as bad, then impacts have been identified and information should be requested by the relevant authorities regarding the quality standards and/ or the threshold values that are not met. Last, but not least if the groundwater chemical status is classified as unknown, there were no data to assess impacts from anthropogenic activities. In this case, the WS needs to contact the relevant authorities and request information update.

Summing up, based on the information collected regarding the status of the surrounding surface water or groundwater bodies the WS assesses the impacts imposed by agricultural activities in general as presented in the following table.

Table 3: Impacts to surface water by agricultural activities

Status	**Surface waters**		**Groundwater**
	Ecological Status	Chemical status	Qualitative status
Classification	High or good	Good	Good
Impacts	No impacts of anthropogenic nature are identified or are considered low.		No impacts of anthropogenic nature are identified
Classification	Lower than good (Moderate, Poor, Bad) or unknown	Failing or Unknown	Poor
Actions to be taken	There are moderate/significant/sever impacts form anthropogenic activities		Impacts have been identified

Impacts on biodiversity, population of protected species etc. are assessed based on information regarding the biological quality elements (ecological status) of surface water bodies and / or information available in expert studies and ecological assessments concerning the area of interest, if any. Environmental impacts on the other hand, defined as impacts on water sources and destinations, air and soil, will also be assessed based on information provided by the relevant authorities and expert opinion. Socio-economic impacts, including impacts on regional population downstream, will be assessed based on the general assumption that water of compromised quality will not be available for other competitive water uses.

2.2.5 Local issues (e.g. sediments, odour, foam, etc.) caused by non-chemical pollution are identified, quantified (if possible) and reported.

Information on local issues (e.g. sediments, odour, foam, etc.) caused by non- chemical pollution, related to agriculture, if such issues exist, will be inquired by the water steward from the competent authorities.

Criterion 2.3: Actions taken to mitigate detected and potential impacts of water discharge shall be described and implemented. All actions should be integrated in the Water Management Strategy (Criteria 4.8).

As all the measures to be taken are preventative, the Water Management Strategy will be based on training and on control measures, to ensure and monitor the degree of farmers' adherence to Good Agricultural Practice.

2.3.1 With reference to indicators 2.2.1 – 2.2.4: Action is taken to mitigate possible impacts*.

Shor-medium term mitigation measures for impacts manifested in any water compartment, e.g. rivers groundwater (nitrates), is only possible *via* the water authority.

Generally, unless an organization has full control over agriculture in an entire basin where agriculture is shown to be the major pollutant, this is not applicable, not even as prevention. However, if it does have even moderate control, then the enhanced preventive measures (training, control for G.A.P. implementation) may act as long-term mitigation process, i.e. to give nature the time for self-recovery.

2.3.2 Only applicable when the productions site discharges to external waste water treatment plants (WWTP): The performance of the WWTP is evaluated in terms of Sustainable Water Management.

- *The water steward indicates whether the contribution to the WWTP is higher than 50% of the total waste water volume treated in the WWTP [m^3].*

Non applicable for agriculture

4. 3RD PRINCIPLE: RESTORE AND PRESERVE WATER-CYCLE RELATED HIGH CONSERVATION VALUE (HCV) AREAS

Explanation: *Sustainable Water Management shall restore and conserve biological diversity and its other associated values in areas that are directly linked to its water-cycle.*

Introduction

High Conservation Value areas (HCVAs) are areas (e.g. wetland, lake or riparian zones) that are, or whose management has a critical influence on:

a. Globally, regionally or nationally significant concentrations of rare, threatened or endangered species.

b. Rare, threatened or endangered ecosystems.

c. The provision of basic services of nature in critical situations (e.g. watershed protection, erosion control).

d. Meeting the basic needs of local communities (e.g. subsistence, health).

e. Critical to local communities' traditional cultural identity, i.e. areas of cultural, ecological, economic or religious significance identified in cooperation with such local communities). (EWS Glossary, 2013).

Ecosystems of HCV areas provide a range of services that benefit people, society and economy at large, which are known as ecosystem services (MA, 2005). Many of these ecosystem services are related to water provision, regulation, purification, and groundwater replenishment, and are crucial in addressing objectives of water security and water for food security. Other ecosystem services play important roles in relation to nutrient cycling, climate change (climate mitigation and adaptation), food security (provision of crops and nurseries for fisheries), job security (maintenance of fisheries, soil quality for agriculture) and a range of cultural benefits, including knowledge (scientific and traditional), recreation and tourism, and formation of cultural values, including identity and spiritual values (IEEP & Ramsar Secretariat, 2013). The Economics of Ecosystems and Biodiversity (TEEB) classification is the most widely used, and identifies the services summarized in the following table (see APPENDIX II for detailed description) as strongly linked to water management:

Table 4: Outline of Ecosystem Services

Category	Service Type
Provisioning	Food, Raw materials, Fresh water, Medicinal resources.
Regulating	Local climate and air quality, Carbon sequestration and storage, Moderation of extreme events, Waste-water treatment, Erosion prevention and maintenance of soil fertility, Pollination and Biological control
Habitat or Supporting	Habitats for species, Maintenance of genetic diversity,
Cultural	Recreation and mental and physical health, Tourism, Aesthetic appreciation and inspiration for culture, art and design, Spiritual experience and sense of place

According EWS standard the impact on changes in water status and linked ecological processes outside the natural range of variation (e.g. salinity or changes in groundwater level) shall be evaluated in high conservation value wetlands, lakes and riparian areas that are linked to the water-cycle of the operation in the frame of AWM system. This includes:

- The localization and description of affected areas with focus on their conservation value
- A description and - if possible - quantification of the impact of water management by the operation on the water status of the high conservation areas and possible consequences for these ecosystems (EWS Standard, 2012).

Finally, in agriculture though -except for modern high-tech glasshouse structures- all land harbors biodiversity which needs protection and enhancement. Biodiversity is the principal contributor to at least two precious elements of agriculture, i.e. ecological stability and landscape aesthetics. The latter is a high value 'service' offered to urban dwellers visiting country side, especially in areas of such natural beauty as south Europe. Thus, water needs of biodiversity of agricultural land, both in terms of quantity and quality, have to be taken account of, in addition to the rest HCVAs.

Criterion 3.1: HCV areas in a 25km radius around the production site, water sources and points of discharge are identified and described.

In the case of EWS standard only the HCVAs are that are directly linked to the water-cycle should be considered and are the following:

- Natura 2000 Sites
- Nationally Designated Areas
- Wetlands of International Importance (Ramsar Sites)
- Small island and other wetlands
- Recreation waters (including bathing waters)
- Water Bodies used for potable water
- Water Bodies to support fish life and shellfish
- Riparian zones
- Nitrate Vulnerable Zones
- Archaeological sites related to water
- Other important areas (for cultural, religious, ecological, socio- economic reasons)

3.1.1 HCV areas mapped in vicinity of the production site (including both sources and discharge points) within a radius of 25 km.

Complete the maps of #1.1.1 and #2.1.2 with this information.

3.1.2 The HCV areas documented in 3.1.1 are listed and protection goal(s) identified (e.g. flora and fauna, water quality, birds, bathing waters, recreational, etc.)

Use the list of AWMS 2nd Form (Deliverable A2.1: Final AWMS Forms, after the evaluation of training farmers and FORs in data collection and www.lifeagroclimawater.eu/en/Default.asp).

Criterion 3.2: Impact* on water status, ecological processes, and social values in HCV areas shall be identified and evaluated.

Towards the identification of HCV areas in the vicinity of the production site, in case of agriculture the parcels or the total area of interest, the following steps should be followed by the WS:

- Map the exact location of each production site/parcel
- Create a 25km radius zone around each parcel or the total area of interest
- Examine whether any of the above mentioned HCV Areas are in the 25km radius zone
- Complete the 2nd Agricultural Water Management System (AWMS) Form (see Deliverable A2.1: Final AWMS Forms, after the evaluation of training farmers and FORs in data collection and www.lifeagroclimawater.eu/en/Default.asp) so as to recognize the HCVAs
- Create an overview map depicting the location of the production site/parcel, the HCVAs, water abstraction points and potential destinations, as identified in principles 1 and 2, respectively. Given that, as analytically explained in the 2nd Principle, in the case of crop agriculture there is no discharge in crop agriculture, potential pollution can start in high risk areas, as identified in indicator 2.2.1. To facilitate impact assessment on HCVAs, high risk areas can be indicated in the above map as well.
- Contact relevant authorities and get information on their designation status on protection and respective protection goals

It should be noted here that in case the 25km radius exceeds the boundaries of the river basin in question no impact on the quantity and quality of the water related HCV areas is expected. Thus, the HCV areas outside the boundaries of the target river basin should not be included in the list.

Information regarding HCVAs of the area of interest can be filled in the 2nd AWMS form (see Deliverable A2.1: Final AWMS Forms, after the evaluation of training farmers and FORs in data collection and www.lifeagroclimawater.eu/en/Default.asp). Information on the protected areas is included in the register of protected areas required under Article 6 of the Water Framework Directive, a summary of which is included in the River Basin Management Plans, accompanied by maps indicating the location of each protected area and a description of the Community, national or local legislation under which they have been designated. More information can be collected from the following sources:

- Natura 2000 Sites: http://natura2000.eea.europa.eu
- Nationally Designated Areas: http://rod.eionet.europa.eu/obligations/32/overview
- Wetlands of International Importance (Ramsar Sites): http://www.ramsar.org/country-profiles
- Important Bird Areas: http://www.birdlife.org/datazone

For Greece, information can also be requested in the following sources

- Natura 2000 Sites: www.ekby.gr/
- Nationally Designated Areas: http://cdr.eionet.europa.eu/gr/eea/cdda1/envviga8g/
- Wetlands of International Importance (Ramsar Sites) http://www.ramsar.org/wetland/greece
- Important Bird Areas: http://www.ornithologiki.gr

- Small Island and other wetlands: http://www.oikoskopio.gr/ygrotopio
- Recreation water (including bathing waters): http://www.bathingwaterprofiles.gr
- Water bodies used for potable Water, Water Bodies to support fish life and shellfish, Riparian zones and Nitrate Vulnerable Zones: http://wfd.ypeka.gr/index.php?option=com_content&task=view&id=113&Itemid=19
- Archaeological sites: http://odysseus.culture.gr/index_en.html

3.2.1 Impacts on the water status of HCV areas, outside the natural range of variation, caused by the production sites' activities or services, are identified, described and, if possible, quantified. Production sites' activities or services, are identified, described and, if possible, quantified.

- The Water Steward of the organization will have to seek this information from the local water authorities, in any form available, and identify a relationship with the agricultural production activities on the registered parcels.
- Impact on water status of HCV can only be assessed based on formal data available. The chemical as well as ecological status of water related HCV areas is an important factor to achieve their protection goals. Thus, the WS needs to collect any data related to the water status of the HCVAs by the competent authorities or the respective river management plan. Then, the contribution of the agricultural sector needs to be assessed. The methodology that could be used is the following:
- Use the maps of the areas assessed as high risks areas for runoff, leaching and erosion already produced in indicator 2.1.2.
- Map the HCV areas as presented in the 2nd AWMS form (see Deliverable A2.1: Final AWMS Forms, after the evaluation of training farmers and FORs in data collection and www.lifeagroclimawater.eu/en/Default.asp).
- Map all the production sites/parcels in which agrochemicals or other substances (e.g manure, compost et.) are applied. Give special attention to all parcels that have deviations from G.A.P. as explained in principle 2. However, as HCV areas may be over-sensitive, even to the quite low exposure that can be achieved through G.A.P. it is possible that special measures have to be designed for some of all of the parcels that relate to a specific HCV area. To capture this possibility, the WS has to fill in information in Form XXX-3.2.1 below.

METAPONTINO	FORM META 3.2.1-HCV AREAS AFFEFECTED BY AGRICULTURAL ACIVITIES ON PRODUCTION SITES					v1 13.11.2016	
Code of parcel	HCV area affected	Type of potential risk	HCVAs protection goal	Chemical status	Ecological status	Type of impact on HCVAs' water status coming from parcel (if any)	Notes
Water Steward			**Signature**		Completed for year yyyy dd/mm/yyyy		

HCVAs protection goals are already included in the 2nd AWMS (criterion 3.1.2) (see Deliverable A2.1: Final AWMS Forms, after the evaluation of training farmers and FORs in data collection and www.lifeagroclimawater.eu/en/Default.asp).
The chemical and the ecological status could be found in the River basin management plan or requested by the competent authority.

The type of impact on HCVAs' water status coming from agricultural sector could only be identified by the competent authorities in the frame of assessment of the monitoring programme for the ecological status of surface water bodies established considering Article 8 of the WFD. More in particular, the biological quality elements examined as part of the surface water bodies' ecological status include information regarding phytoplankton (taxonomic composition, average abundance and planktonic blooms), macrophytes and phytobenthos (taxonomic composition and average abundance), benthic invertebrate fauna (taxonomic composition and abundance, sensitive taxa to insensitive taxa, diversity of invertebrate taxa) and fish fauna (species composition and abundance, disturbance sensitive species, age structures of fish communities). Changes in the status of HCVAs can also be identified by means of comparison to the Natura 2000 sites standard data forms. In any case, impact assessment on HCVAs should be based on formally available data from authorities and/ or ecological studies, since owed to the high scientific specialization required these cannot be assessed by farmers and/ or the WS. For this reason, the WS should communicate with the relevant authority in order to complete the last column of the previous form.

3.2.2 The impacts on social and cultural values of HCV areas caused by the production sites' activities or services are identified, described and, if possible, quantified.

As mentioned before, the HCV areas are ecosystems that provide services to the society as it is already described in the introduction of the 3rd principle. If their ecological features and functions would be disturbed due to water abstraction or discharge, impacts will also be posed to the social and cultural values provided to the society.

The main social and cultural services that ecosystems provide to the people from the ('TEEB') classification are these presented in Form XXX-3.2.2 below. The WS should assess potential impacts on social and cultural services stemming from the production sites' activities or services.

METAPONTINO	FORM META-3.2.2 IMPACTS ON SOCIAL & CULTURAL VALUES PER EACH AFFECTED HCV AREA		v1 13.11.2016
Impacts on (SEE Annex 2)		Y/N	Comments
Social values / services			
Fresh water supply			
Food provision			
Raw material provision			
Other			
Cultural values/services			
Tourisn and recreation			
Aesthetic enjoyment and inspiration for culture, art and design			
Spiritual or religious actiities			
Other			
Water Steward	**Signature**		Completed for year yyyy dd/mm/yyyy

Criterion 3.3: Actions taken to mitigate detected and potential impacts of HCV areas shall be described and implemented. All actions should be integrated in the Water Management Strategy (Criteria 4.8).

3.3.1 Action is taken to mitigate the impacts described in indicator 3.2.1 and 3.2.2.

Having identified the impacts on water status as well as on social and cultural values of HCVAs action to mitigate or reverse impacts should be proposed. The actions could not be different than those already proposed in Criteria 1.3 and 2.3, since in order to

mitigate impacts imposed on the status and thus services provided by HCVAs, action to reduce water abstraction (quantitative) and/ or water pollution derived from agriculture sector should be taken. Moreover, information on specific measures included in a particular strategy for the protection of the HCVAs, if it exists, should be searched by the relevant HCVAs management body or authority.

In any case and irrespective of whether action to mitigate potential impacts is required on the farm level, provision of information and training of farmers regarding HCVAs, ecosystem services and their importance is considered a substantial step towards the protection of water related HCVAs. The WS should schedule information exchange, presentations and other activities in order to enhance awareness among farmers and other water users in the river basin.

The analysis performed in criterion 3.2 aimed at understanding of HCVAs functions and services provided to people as well as at the identification of specific measures that have been proposed by the HCVA's competent authorities for their protection and monitoring. Should any of these measures concern agriculture they must be adopted by the organization and included in its Water Management Adaptation strategy. Then, the WS should provide information and training to registered farmers in order to enhance awareness regarding the value of ecosystems in the area of interest, the protective measures included in the WMAS and their implementation.

Finally, the WS should monitor the implementation of these measures by the registered in the AWM system farmers and prepare a report at the end of each year in order to inform Administration.

5. 4TH PRINCIPLE ACHIEVE EQUITABLE AND TRANSPARENT WATER GOVERNANCE*

Explanation: *The water steward shall achieve an equitable system for its water use*, make its Water Stewardship*policy publicly available and raise awareness for Water Stewardship by pro-active measures. Therefore, the water user shall establish, implement and maintain procedures in the management plan and operational practice based on the following points.*

This principle refers explicitly to a 'continuous improvement' approach rather than a 'performance level' approach in relation to river basin sustainability, unless additional minimum performance requirements are specified.*

Introduction

Here, again agriculture differs significantly from industry or other areas of economy. Due to socioeconomic history and structure in Greece and south Italy, land management is performed by a large number of small owners, as opposed to the 'one (or a few) man rule' in industry, or big estate farms. This makes agriculture the most challenging area for achieving goals related to areas as large, as the water basins are. However complicated in agriculture, the objective of development and implementation of a water management adaptation strategy is of core significance for sustainable primary production which is the backbone of rural economies in south Europe.

Hence, the importance of effective water management by the stakeholders-farmers in an area, including policy making and goal setting, consultation, structures, roles and responsibilities, all in support of the state authorities responsible for the enforcement of water legislation.

EWS uses a **system approach**, i.e. it is not restrained to satisfying baseline[5] requirements, but requires that the organizations strive for their continuous improvement, developing their goals, objectives and targets *via* instructions customized to the real needs of each land parcel. So, each organization defines its own strategy towards its goals, i.e. its own AWMS. The fourth principle of EWS provides the criteria for building an effective and efficient water management system by your organization.

Consult the EWS MS&CG Scheme Guideline!

Before starting to deal with the 4th principle in detail, you may wish to have an idea of how things were historically. Use the questionnaire of the 3nd AWMS Form (see Deliverable A2.1: Final AWMS Forms, after the evaluation of training farmers and FORs in data collection and www.lifeagroclimawater.eu/en/Default.asp).

[5]Baseline requirements include the legislative (national, local) and the "Good Agricultural Practice" ones, i.e. they are not specific for a parcel or for a distinct local environment.

Criterion 4.1: The water management shall ensure compliance with all legal requirements linked to water use.

4.1.1-1 A person or department is identified who ensures compliance with legal requirements linked to water.

Please refer to the 2nd Step, as well as Form XXX-1 (in APPENDIX I).

4.1.1-2 Procedures are established, implemented and monitored which ensure that legal aspects and compliance with the law by the production sites on water abstraction, reuse or discharge are entirely disclosed and kept up-to-date.

Please refer to the 2nd Step, as well as Procedure XXX-PL.

Criterion 4.2: Water management in the supply chain shall be evaluated on long term. The purchase of products and material from water sustainable suppliers shall be achieved over time according to the possibilities of the organization.

4.2.1 The water steward classifies its supply chain of products and materials according to:

1) Location

2) Transparency on water use.*

4.2.2 The water steward describes whether its suppliers are certified according to a Water Stewardship standard and whether there are referring certificates available.

As indicated in EWS Standard, this criterion is not applied in agriculture.

Criterion 4.3: Water use shall be managed in an integrated approach taking the management of other resources into account.

4.3.1 The (quantitative) relation of water and energy use is identified and optimized.

4.3.2 The (quantitative) relation of water and other resources than energy is identified and optimized.

- The energy (fossil fuel and electricity) consumption not only for irrigation but for other activities incorporated into the agricultural production procedure, such as fertilizer application, plant protection related activities, soil cultivation/weed management, pruning and harvesting has to be documented and optimized. Therefore, Forms 4.3 (for

METAPONTINO		FORM META-4.3 ACIVITY DIARY PER PARCEL											v1 13.11.2016
Date	Parcel (Code)	Pruning (Yes/No)	Mechanical Cultivation (Yes/No)	Mechanical weed control (Yes/No)	Harvesting (Yes/No)	Wages payed for activity (€/parcel)	Farmer's time spent on activity (Hr/parcel)	Energey used for activity (Lit oil)	Energey used for activity (Lit petrol/parcel)	Energy cost / activity (€/parcel)	Other costs / activity (€)	Yield (Kg/Parcel)	Estimated yield losses (%)	Notes
Farmer					Signature					Completed for year yyyy dd/mm/yyyy				

primary data by the farmer and 4.3a (processed data by the Water Steward) contain information both on water and energy use per parcel, in relation to the various activities in the parcel.

METAPONTINO	FORM META-4.3a CUMULATIVE ACTIVITY SPENDING													v1 13.11.2016	
	Irrigation		Pruning (energy)		Fertilization			Cultivation(energy)		Plant Protection			Harvest (energy)	
Parcel (Code)	M3/Ha	m3/Kg	Lit/Kg	Lit/m3 water	Lit/Kg	Lit/m3 water	Kg N-P-K/m3 water	Lit/Kg	Lit/m3 water	Lit/Kg	Lit/m3 water	Kg a.i.s/m3 water	Lit/Kg	Lit/m3 water
Water Steward					Signature					Completed for year yyyy dd/mm/yyyy				

- Identify and evaluate measures and practices that will lead to improvement and optimization of water management in relation to other resources. In the case of agricultural sector a wide range of management practices, such as those proposed by AgroClimaWater project are included. These practices will be defined in Best Management Practices document (Criterion 4.6). For example, by applying appropriate pruning, a reduction of water evaporation and transpiration water losses is expected and consequently improved water use efficiency is expected. Also, proper soil management can lower leaching and runoff potential, increasing thus water retention, hence the efficacy of irrigation, and reducing water losses.

Criterion 4.4: Efficiency of water consumption* shall be increased by water re-cycling, higher water savings and thereduction of water losses*. Out of scope: Water in products and material for production (ref. Criteria 4.2), storage on site and diffuse water losses.

4.4.1 Recycling is included in the water management strategy and the volume of recycled/re-used water*is monitored.

Non-applicable. There is no such a practice applied in open field agriculture.

4.4.2 Water losses are identified. Type and destination* of losses are described.

Keep in mind that water is considered as lost when it does not return to its source. For example, when irrigation water source is an aquifer and an amount of the applied water turns into surface runoff then this amount of water is considered as lost. If the amount of water lost through surface runoff was draining into the aquifer, it would not be considered as lost.

- Potential destinations of water losses are: a) atmosphere when water is lost though evaporation, b) the adjacent surface water body when water is lost through surface runoff and c) the underlying aquifer when water is lost through deep percolation.
- Water losses in agriculture cover a significant portion of water used. Sometimes water losses may be higher than 50% of irrigation water abstractions. Therefore there is always a significant potential for water saving by identifying and reducing water losses. Irrigation process can be divided into three components:
    - the distribution-conveyance component, which corresponds to the distribution and transportation of irrigation water from the source to the field,

- the on-farm application component, which corresponds to the application of irrigation water in the field with an irrigation system-method.
- the storage component, which corresponds to the special constructions (such as dams) that irrigation water is collected prior to the distribution in the farms.

- Water distribution systems in cultivations are categorized into furrow and piping systems. With regard to furrow, water losses are mainly attributed to evaporation from water surface and water percolation along the system. Some indicative average conveyance efficiencies are 70% and 85% for well maintained-operated earthen channels and lined canals, respectively, while the corresponding efficiency for piping systems is 95%. Please keep in mind that accidental leakages may also be occurred in distribution systems because of system failures (such as broken pipes), resulting in water losses through surface runoff, drainage or evaporation.
- With regard to the on-farm application of irrigation water, the water losses potential is significantly different depending on the irrigation system applied (surface irrigation, sprinkler irrigation, drip irrigation). For surface irrigation, such as furrow irrigation, evaporation, surface runoff and drainage are the three major water loss mechanisms. In terms of sprinkler irrigation, except from evaporation, wind drift and spray losses are also considered. Indicative field application efficiencies of irrigation are 60%, 75% and 90% for surface, sprinkler and drip irrigation, respectively. Except from the above, on-farm conveyance losses have to be considered because of accidents or not well-maintained irrigation systems resulting in water losses through surface runoff, drainage or evaporation. Moreover, the application of irrigation water above the crop requirements may result in significant water losses, mainly through evaporation, surface runoff and drainage.
- Like an open water body, the irrigation water storage constructions are exposed to the evaporation process. Depending on the climate conditions, water losses from the storage construction through evaporation may be significant.

All the above, as well as the estimation procedure of water losses during the irrigation process are summarized in form XXX-4.4 below. It has to be mentioned that the appropriate considerations have to be made, depending on the irrigation water source and water loss destination. Therefore, total water loss has to be properly adjusted. Moreover, accidental water losses have to be considered when such incidents are happening and are significantly affecting water losses.

METAPONTINO Parcel:		**FORM 4.4 IRRIGATION WATER LOSSES**				**LRI v1 29.11.2016**
Distribution – conveyance water losses (%)						
Type of water distribution system	Evaporation [1]		Deep percolation [2]			Total water distribution losses [3]=[1]+[2]
Open canals						
Piping system	-					
On-farm water application losses (%)						
Type of irrigation system	Water Distribution System [4]	Surface runoff [5]	Deep Percolation [6]	Soil & Canopy evaporation [7]	Wind drift [8]	Total on-farm water application losses [9]=[4]+…+[8]
Furrow					-	
Sprinkler						
Drip		-		-	-	
Water storage losses (%)						
Type of storage system	Evaporation [10]		Deep Percolation [11]			Total water storage losses[[12]=[11]+[12]
Reservoir or dam						
TOTAL IRRIGATION WATER LOSSES (%) 13=[3]+[9]+[12]						
Water Steward		**Signature**			**Completed for year** yyyy dd/mm/yyyy	

4.4.3 A strategy is in place and described to achieve optimized water efficiency.

- *The water steward describes the water savings which have been achieved by increasing efficiency and reducing losses.*
- *Steward describes, maintains and optimizes any irrigation system to different crops and climatic and on-site conditions.*

• By comparing data recorded in Form XXX-4.3 year after year, the Water Steward of the organization has to fill-in the results in the following table XXX-4.3a. It has to be mentioned that the compared periods have to be of the same extent.

METAPONTINO	FORM META 4.3b-MONITORING WATER EFFICIENCY				v1 13.11.2016		
Parcel code	Initial irrigation (m3/Ha)	Initial effective rainfall (m3/Ha) Initial effective rainfall (m3/Ha)	Measures taken	Current irrigation (m3/Ha)	Current effective rainfall (m3/Ha)	Water savings (m3/Ha)	Notes
Water Steward			Signature		Completed for year yyyy dd/mm/yyyy		

In the interpretation of the savings, care should be taken not to ignore temporal variability, which in agriculture can be significantly large. Especially for water consumption which can be variable due to deviations of rains during the irrigation period. This variability can be measured only by using data of 'control' crop parcels, unaffected by the measures taken.

4.4.4 Water consumption per unit (e.g. of product) is quantified.

Please refer to Form XXX-4.3.

Criterion 4.5: Sustainable Water Management shall be achieved by internal and external transparency and raising awareness.

4.5.1 A person or department is identified who participates and reports on River Basin Committee's activities.

Ensure that assignments of Step 2 (Form XXX-1) are in place, still valid (e.g. not expired) and active (records documenting recent activities of the responsible person are available).

4.5.2 Internal transparency: Sustainable water management is disseminated within the operation.

Refer to 4.8.1-1.

4.5.3 External transparency: The water management is publicly available for customers, the public and authorities, e.g. by a water report.

Refer to 4.8.1-1.

4.5.4 Campaigns or partnerships to inform stakeholders on water topics are described and implemented.

Promotional campaigns have to be organized and implemented on topics related to water. Themes such as efficient irrigation (scheduling, methods, deficit irrigation, irrigation systems maintenance) and implementation of good agricultural practices that

promote the sustainable water management from both the quantitative and qualitative point of view can be included in the campaigns.

4.5.5 Management of incidents:

1) Procedures are established, implemented and monitored to respond to accidents, security incidents, emergency situations, disasters and the like.
2) The impacts of such an occurrence to the environment, employees, the regional population and communities are described or estimated.

Risk assessment and risk management procedures have to be established which will include emergency situations such as flooding, leakages, fire, and droughts. Risk management procedures must be based on the related civil protection plans developed by governmental authorities.

4.5.6 Only applicable for irrigation: Measures or facilities to deal with unforeseen climatic conditions and system breakdown are implemented and monitored.

Unforeseen climate conditions such as long-term droughts can significantly affect irrigated agriculture due to significant divergence in irrigation water availability. Since the development of measures or facilities is highly depending on the local climate and water resources management conditions, as well crop type, a case specific approach has to be followed. With regard to long-term droughts the general directions that could be followed are: a) check for alternative water sources, b) implement deficit irrigation if it is allowed by crop type or more efficient irrigation methods, c) minimize as much as possible the water losses and d) check the possibility of developing facilities such as water retention basins and water recycling-reusing. In the case of system breakdown, the direction of solving the problem the sooner should be followed.

Criterion 4.6: Continuous improvement* of Sustainable Water Management shall be achieved on operational and River Basin level by implementation of BMPs* and by innovation and development on long term.

4.6.1 Best Management Practices (BMPs*) are in place and integrated in a water resource management strategy.*

- This is practically the only way to address the second principle. See 2.1.1.
- The results of the implementation of BMPs - G.A.Ps in our case- per parcel and per farmer (economic) have to be identified and recorded, so that G.A.Ps s can be validated (see 4.6.2) and used for continuous improvement steps.

If no recognized BMPs are in place the water steward him/herself identifies appropriate BMPs.

- Best management practices have to be customized for the farmers of the basin, or at least -if generic G.A.Ps are used- the most relevant elements -covering the three first principles- have to be spotted and be the subject of farmers training.
- A G.A.P document, either specific or generic with highlighted topics, most suitable for the farmers registered should be produced by the nominated Water Steward in the organization.

4.6.2 The implementation procedures and the evaluation of BMPs (or alike) are described.

- The validity of the above-mentioned G.A.P. (BMP) has to be monitored against a) its ability to produce the desired results, and b) its acceptance by the farmers who use it. So, training has to be combined with consultation on applicability and improvements.
- The implementation of the G.A.P. is to follow the provisions of 2.1.1 on the control system.

4.6.3 The water steward implements and documents innovative measures to improve the sustainability of the internal and the river basin water management.

- A list of the innovative measures and practices has to be developed in case that such measures are implemented especially for each case, because they are depending on the local climate and water management conditions. Such measures may include advanced irrigation scheduling techniques, high performance irrigation methods etc.

Criterion 4.7: Transparency on economic aspects of water management shall be ensured. Investments made for maintenance and improvement of the water management are fully reported.

4.7.1 An environmental cost analysis is in place.

- It is advisable to make a business plan at the beginning of the project, which will indicate the resources needed and the time required to pay back the investment of the organization in services and -if applicable- in materials.
- In case of no direct involvement of the organization in water management, e.g. FORs in agriculture, care should be taken to describe the 'product' offered by the organization to the farmers. If the product is e.g. services that will only produce results in the long-run, its 'value' for the farmers must be benchmarked against justification for a revenue. If this seems unachievable-i.e. if the 'value' is not readily recognized by the farmers, a plan has to be made asking for state support in order to carry on in the future with the project.
- Most importantly, please consider the proportion of the farmers in a basin/sub-basin would register with your organization. If the proportion is small, it will be quite difficult to produce a 'recognizable' product of your efforts.

Criterion 4.8: A water resources management strategy shall be available at the production site as it is a crucial tool to integrate all activities related to water use. It initiates and supports management decisions on water management performance and facilitates the public and internal transparency.

4.8.1-1) An exhaustive water resources management strategy, which covers all 4 Water Stewardship principles, is established, implemented and monitored.

- The strategy must be realistic, fully based initially on the business plan, and then on the yearly economic results of the project.

- The strategy has to be documented, signed by top management, communicated to all interested parties within and out of the organization (customers, stakeholders) in line with the organization's policy, and explicit enough with regard to the objectives and targets to be achieved. Ensure that the following are adequately covered:
  - ***i.*** Distribution list within the company
  - ***ii.*** Distribution list to interested parties
  - ***iii.*** Training records -if needed- for the farmers–implementers of the strategy.

  Also,
  - **iv.** Carry out a gap-analysis to indicate clearly which elements of the strategy relate to which principle-indicator.
  - **v.** Document a reporting schedule for the Water Steward to monitor and validate the results of the implementation of the strategy.
  - **vi.** Plan an internal audit to verify that the above report is substantiated by records.
  - **vii.** Produce an annual report to the top management for the degree of achievement of the strategic objectives
- It is important to make a clear link between the strategy and the 4 principles of EWS, and if possible with the indicator(s) addressed.

4.8.1-2) A person or department is identified who ensures the implementation of the water resources management strategy.

Ensure that assignments of Step 2 (Form XXX-1) are in place, still valid (e.g. not expired) and active (records

REFERENCES

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- Directive 2000/60/EC for the establishment of a framework for Community action in the field of water policy. Available at: http://eur-lex.europa.eu/legal-content/EL/TXT/?uri=CELEX:32000L0060

APPENDIX I: AWMS - ADMINISTRATIVE FORMS

Form XXX-1: Roles Assignment in F.OR

METAPONTINO	Form XXX-1 Roles Assignment in F.OR.	v1 - 13.11.2016
Author/Signature	Editor/Signature	

Form XXX-1
Roles Assignment in F.OR

Date:__/__/_____

The present assignment refers to the project of our organization to comply with the requirements of the EWS standard, implementing our policy on water, issues decided on __/__/_____ and the related strategy.

Mr/Mrs _____ from __/__/_____ will be responsible for:

1. As RL (Responsible for Legal matters), to follow up, summarize in Form XXX-L and brief management on legal matters relating to water management, according to the procedure XXX-PL.

2. As RB (Responsible for River Basin's Committee) to:

   - Make formally known the commitment of the Organization for the implementation of the EWS project to the above Committee, and describe his role.
   - Maintain regular contacts with the local River Basin Committee, according to a schedule that he will document, in order to establish a two-way communication with regard the issues concerning the Organization and the EWS project. Also, to participate in meetings and training events, and to inform the Organization on activities or decisions that affect its water policy and strategy, and to report accordingly.

3. As Water Steward to ensure the implementation control and monitoring the results of the organization's Water Management Strategy, by taking all necessary measures, according to the EWS Standard, the Guideline document and the Quality Manual referring to the Water Strategy.

For the management	The employee
Name	Name
Signature	Signature

Form XXX-0: Contract

METAPONTINO	Form XXX-0 Farmer's Contract for EWS	v1 - 13.11.2016
Author/Signature	Editor/Signature	

Form XXX-0

Contract

Today, dd/mm/yy the following agreement was signed between A) the Farmers' Organization (F.OR) _____ which is a Legal Entity of the form_____, located in _____ and is represented by _____ and B) the farmer with ID number _____, resident of _____owner / manager of the parcels registered in Annex 1 _____

A. Objective of the agreement is the implementation of the requirements of the EWS standard on the parcels of the farmer that are specifically registered for the EWS project.

B. Obligations of the F.OR:

- To have top management decision for the implementation of EWS standard, and to formulate the respective policy, objectives and strategy towards achieving them, as well as to develop a Quality System, including an Internal Regulation for its relationships with its members–farmers registered to implement the standard.
- To make sure that it can provide the human, financial and other resources required at administrative level for the operations needed.
- To provide technical support, training and consultancy services to the farmer for the implementation of the standard in his registered farms.
- In case a decision is taken for certification, to commit itself for the implementation of the document "Guideline document for EWS Multi site and Catchment group scheme implementation" (EWS MS&CG Scheme Guideline)**,** in addition to the EWS standard.
- To ensure good communication with water authorities for the basin(s) under the organization's control.

C. Obligations of the Farmers:

- To commit for compliance with: a) EWS Standard, b) the specific requirements issued for his registered farm(s) by F.OR's technical personnel and the supporting experts and c) the Internal Regulation of the F.OR. and - in case he wishes to participate in EWS certification- with d) the "Guideline document for EWS Multi site and Catchment group scheme implementation" (EWS MS&CG Scheme Guideline) in addition to the above.
- To declare by signing the respective page in Appendix A all his parcels, within the basin(s) covered by the scope of EWS project undertaken by the F.OR, and more specifically the parcels to be included in the EWS project. He should provide justification for not including the remaining parcels located within the basin(s), in the project.
- To provide to the responsible F.OR personnel accurate information for his activities in relation to the registered parcels, by filling-in and signing the respective forms. Also, to provide generic information for the remaining parcels within the basins) as requested by F.OR.

- To participate in all the scheduled training events organized by F.OR on EWS project.
- To participate in decision making e.g. for the Internal Regulation, and other internal consultation and communication activities organized by F.OR on EWS project.

D. Economic issues.

Will be decided *ad hoc* and will be included in the Internal Regulation

E. Duration

Initial duration is set to 10 years, extendable without further notice. It can be resolved by the farmer with written notice, and by the F.OR by implementing the provisions of the Internal Regulation.

On behalf of the F.OR	The Farmer
Full name and signature	Signature

METAPONTINO	Form XXX-0 Farmer's Contract for EWS	v1 - 13.11.2016
Author/Signature	Editor/Signature	

Contract
Annex 1

No	Parcel's code	Location	Coordinates	Area (ha)	Crop	Participation in EWS project (YES/NO)	Justification for NO
1							
2							
3							
4							
5							
6							
7							

Farmer: _____ Signature:_____ Date:_____

Form XXX-PL: Procedure for following up legal matters on water

METAPONTINO	Form XXX-PL Procedure for Legal Matters	v1 - 13.11.2016
Author/Signature	Editor/Signature	

Procedure for following up legal matters on water

Objective: To ensure that legal and other e.g. contractual, requirements are not overlooked, and that their implementation is controlled, monitored and reported to the Management.

Owner: The person assigned the role of Responsible for Legal matters (RL), or in absence of this role, the Water Steward (WS) for the organization.

Related documents: Form XXX-1 (assignment of the role of water steward).

Description: The RL, or in his absence the WS:

1. Collects information on new legislation or other obligations of the Organization, e.g. contracts with reference to water, new standards to which it abides, etc. For this:
   - lists all possible sources of information for EU, national and local legislation that refers to water in the basin of interest to the Organization, by means of e.g. links to EUR-Lex, national (Ministry) and communication with local authorities. Also, local press and other mass media that may broadcast news on water in the area, should be included in the list.
   - For each source, the WS makes a plan to follow-up regularly, to identify newly appearing legislation relevant to the activity of the organization. Information-collection activity should be documented, even if not always productive, i.e. when there is no new legislation to report.
   - The results of information-collection are recorded on form XXX-L summarizing the points of the new legislation that require action by the Organization and by each farmer individually, where applicable. In such a case, the RL or the WS drafts a plan for the management of the Organization to comply with the new legislation (or other) requirement, including formal notification to the farmers where needed.
2. Monitors compliance to the existing water-related legislation and other obligations, asking for information by the control system of the Organization which he uses to produce a 'report on compliance' to the management.

Records: The following documents are kept in Organization's Records for 5 years:

- Communication and information-collection record, on a yearly basis (forms XXX-L).
- Legislation, contracts, standards etc, as part of Organization's external documents.
- Reports of responsible person to the management, on legal compliance.

Form XXX-L: Record of legal and other requirements

METAPONTINO	Form XXX-L Procedure for Legal Matters	v1 - 13.11.2016
Author/Signature	Editor/Signature	

Record of legal and other requirements

Date	Legislation	Articles	Topics of interest	Importance (1-3)	Organization's compliance	Action plan - Deadline
Water Steward			Signature		Date of last update:	

APPENDIX II: ECOSYSTEM SERVICES

LIST OF ECOSYSTEM SERVICES (see 3rd Principle in p. 23)	
Category	**Service Type**
Provisioning	**Food**: Ecosystems provide the conditions for growing food. Food comes principally from managed agro-ecosystems but marine and freshwater systems or forests also provide food for human consumption. Wild foods from forests are often underestimated. **Raw materials**: Ecosystems provide a great diversity of materials for construction and fuel including wood, biofuels and plant oils that are directly derived from wild and cultivated plant species. **Fresh water**: Ecosystems play a vital role in the global hydrological cycle, as they regulate the flow and purification of water. Vegetation and forests influence the quantity of water available locally. **Medicinal resources**: Ecosystems and biodiversity provide many plants used as traditional medicines as well as providing the raw materials for the pharmaceutical industry. All ecosystems are a potential source of medicinal resources
Regulating	**Local climate and air quality**: Trees provide shade whilst forests influence rainfall and water availability both locally and regionally. Trees or other plants also play an important role in regulating air quality by removing pollutants from the atmosphere. **Carbon sequestration and storage**: Ecosystems regulate the global climate by storing and sequestering greenhouse gases. As trees and plants grow, they remove carbon dioxide from the atmosphere and effectively lock it away in their tissues. In this way forest ecosystems are carbon stores. Biodiversity also plays an important role by improving the capacity of ecosystems to adapt to the effects of climate change. **Moderation of extreme events**: Extreme weather events or natural hazards include floods, storms, tsunamis, avalanches and landslides. Ecosystems and living organisms create buffers against natural disasters, thereby preventing possible damage. For example, wetlands can soak up flood water whilst trees can stabilize slopes. Coral reefs and mangroves help protect coastlines from storm damage. **Waste-water treatment**: Ecosystems such as wetlands filter both human and animal waste and act as a natural buffer to the surrounding environment. Through the biological activity of microorganisms in the soil, most waste is broken down. Thereby pathogens (disease causing microbes) are eliminated, and the level of nutrients and pollution is reduced. **Erosion prevention and maintenance of soil fertility**: Soil erosion is a key factor in the process of land degradation and desertification. Vegetation cover provides a vital regulating service by preventing soil erosion. Soil fertility is essential for plant growth and agriculture and well-functioning ecosystems supply the soil with nutrients required to support plant growth. Pollination: Insects and wind pollinate plants and trees which is essential for the development of fruits, vegetables and seeds. Animal pollination is an ecosystem service mainly provided by insects but also by some birds and bats.

	Some 87 out of the 115 leading global food crops depend upon animal pollination including important cash crops such as cocoa and coffee (Klein et al. 2007). **Biological control**: Ecosystems are important for regulating pests and vector borne diseases that attack plants, animals and people. Ecosystems regulate pests and diseases through the activities of predators and parasites. Birds, bats, flies, wasps, frogs and fungi all act as natural controls.
Habitat or Supporting	**Habitats for species**: Habitats provide everything that an individual plant or animal needs to survive: food; water; and shelter. Each ecosystem provides different habitats that can be essential for a species' lifecycle. Migratory species including birds, fish, mammals and insects all depend upon different ecosystems during their movements. **Maintenance of genetic diversity**: Genetic diversity is the variety of genes between and within species populations. Genetic diversity distinguishes different breeds or races from each other thus providing the basis for locally well-adapted cultivars and a gene pool for further developing commercial crops and livestock. Some habitats have an exceptionally high number of species which makes them more genetically diverse than others and are known as 'biodiversity hotspots'.
Cultural	**Recreation and mental and physical health**: Walking and playing sports in green space is not only a good form of physical exercise but also lets people relax. The role that green space plays in maintaining mental and physical health is increasingly being recognized, despite difficulties of measurement. **Tourism**: Ecosystems and biodiversity play an important role for many kinds of tourism which in turn provides considerable economic Walking benefits and is a vital source of income for many countries. In 2008 global earnings from up to tourism summed US$ 944 billion. Cultural and eco-tourism can also educate people about the importance of biological diversity. **Aesthetic appreciation and inspiration for culture, art and design**: Language, knowledge and the natural environment have been intimately related throughout human history. Biodiversity, ecosystems and natural landscapes have been the source of inspiration for much of our art, culture and increasingly for science. **Spiritual experience and sense of place**: In many parts of the world natural features such as specific forests, caves or mountains are considered sacred or have a religious meaning. Nature is a common element of all major religions and traditional knowledge, and associated customs are important for creating a sense of belonging.