ALLIANCE FOR WATER STEWARDSHIP

# WATER STEWARDSHIP: UNDERSTANDING THE AGRICULTURAL LANDSCAPE IN SPAIN

In collaboration with:

WWF | STRONG PARTNERS FOR MORE SUSTAINABILITY. | EDEKA

Citrus farm "El Cerro" (Seville) bordering its on-farm reservoir. Credit: Alex F. Poulussen - Good Stuff International and Iberhanse/Naturgreen

# ABOUT THE REPORT

**This report has been developed under a partnership between the Alliance for Water Stewardship (AWS), EDEKA and World Wide Fund for Nature (WWF) focusing on water stewardship in the agricultural sector.**

- **To learn more about AWS's role, visit: a4ws.org/agriculture**
- **Additional resources developed for the partnership are available at: a4ws.org/resources**

**The report was prepared by Good Stuff International (GSI), on behalf of AWS, drawing on their experience working with the AWS System and on water stewardship activities in Spain.**

Alliance for Water Stewardship (AWS) is a global organisation with team members around the world.
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Zahara reservoir (Cádiz). Credit: Alex F. Poulussen - Good Stuff International

# INTRODUCTION

With a growing interest in water stewardship within agricultural value chains in Spain, the Alliance for Water Stewardship (AWS) has developed this comprehensive, easy-to-use resource to help Spanish agricultural organisations apply the International Water Stewardship Standard (AWS Standard) in their local contexts. It sits alongside the AWS General Guidance and specific case studies to share insights and practical information for implementing AWS Standard criteria[1,2]. It can also be used by auditors at Water Stewardship Assurance Services (WSAS) Ltd. who wish to learn more about water stewardship in this sector and region.

# WHY THIS DOCUMENT?

Spain is the largest producer of fruit and vegetables in the European Union and exports the majority of its produce to European markets[3,4]. Over the last few decades, increasing technification and water efficiency have led to a significant decrease in the amount of water required per unit of produce. The increase in crop productivity, however, has increased demand for cultivated land and, as a result, water required for irrigation[5]. In 2021, water consumption for agricultural irrigation reached around 25,000hm3 per year, which is 80% of total water consumption in Spain[6, 7]. This puts a lot of pressure on the water resources of a country that is already the most arid in Europe and vulnerable to climate change.

With markets demanding sustainable water use, Spain is facing serious risks relating to water quantity and quality, despite highly efficient agricultural production. These risks include water shortages that damage protected areas and fragile ecosystems, affect other stakeholders in the value chain and, through declining productivity, the markets that rely on produce from Spain. In Doñana National Park, Andalusia, and Mar Menor, Murcia, for example, agricultural practice has been linked to negative impacts on ecosystems, over-abstraction, poor governance, social issues and illegal water use. Multiple factors, including conflicting priorities, can influence water use in Spain and issues turn political quickly.

Good on-site (or on-farm) water management is not enough by itself. The issues described above can only be addressed through a transparent and objective water stewardship approach that covers the entire catchment and captures the interests of all stakeholders in water use and governance. The AWS Standard is designed to support the development of water stewardship strategies by providing a robust framework and certification system that enables credible action. The AWS Standard is the pinnacle of water stewardship practice and the most advanced framework to move towards sustainable water use beyond the site.

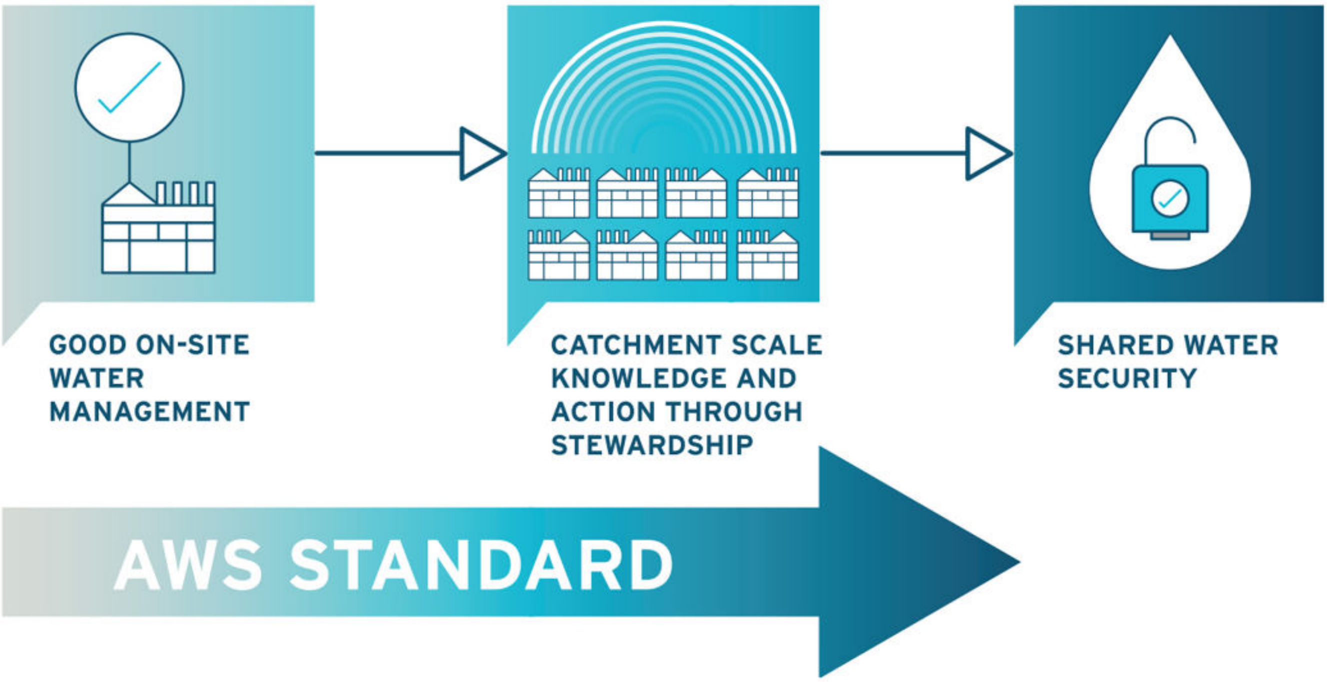


Diagram 1: The AWS Standard approach

# THE SPANISH AGRICULTURAL CONTEXT

**Within the Spanish agricultural context there are some important inter-related factors for consideration beyond AWS Standard requirements.**

## LEGALITY

There is much evidence highlighting illegal water practices in Spain[8]. Although most regulations and standard schemes seek to guarantee legal water use, there are many cases in which this legality cannot be easily verified. This is due to factors including, but not limited to, slow administrative processes and unclear water rights. A transparent, thorough system is necessary to verify water use legality and factors such as land use, through both on-site and virtual checks. This not only helps prevent potential environmental damage, but also protects the sector's reputation, helping it gain credibility with international supply chains. A sharp focus on legality supports a water stewardship approach by considering catchment-level water management plans and contextual regulations beyond the site. It also helps with stakeholder engagement throughout the value chain as full legal compliance becomes an increasingly important factor in commercial agreements.

## EFFICIENCY

Considering the entire catchment when planning on-site activities guarantees the most efficient use of water in relation to context. Following best practice in water use, soil management, fertilisation and pest control enables sites to deal with challenges around water scarcity, droughts and climate change as well as promoting soil health, preventing diffuse pollution, protecting biodiversity and meeting regulation demands. It is also the only way to monitor water targets and get quantifiable data that meet legal demands related to, for example, water allocations or nitrate application limits. This is particularly important for AWS criteria relating to sustainable water balance.

There is also the problem of 'Jevon's Paradox' to consider when implementing modern irrigation systems[9]. This is a pattern of resource use first described in 1865 by William Jevons when he found that technological improvements that increased the efficiency of coal use also led to increased consumption of coal in a wide range of industries because it made more coal available while lowering the relative cost of the resource. Jevons argued that technological progress alone could not be relied upon to reduce fuel consumption. This pattern has since been observed in Spain where the modernisation of some Irrigation Communities has improved water use efficiency but has also led to an increase in water consumption in absolute terms[10].

## CATCHMENT-LEVEL SUSTAINABILITY

Both legality and efficiency rely on considering the entire catchment in water resource decisions. A site could be implementing the most advanced and efficient irrigation techniques, investing resources in modern devices and strictly complying with legality, but if other water users in the same catchment are consuming or polluting beyond contextual limits and governance regulations are not sufficiently enforced, then the site will be exposed to serious risks.

Understanding the entire catchment context through reliable, evidence-based data is therefore essential. It requires having systems in place to gather and interpret the most recent official datasets on water quantity, water quality and ecosystems, as well as legal frameworks and details of key stakeholders. This information provides a solid base for understanding water risks and challenges at catchment-level, and planning appropriate actions to address them with other stakeholders. Many AWS criteria – from physical scope to stakeholder engagement – require detailed catchment-level information.

# WATER MANAGEMENT VS WATER STEWARDSHIP

Good water management is a process in which sites gather data about their water use and act upon the findings. This can include, for example, site-level pollution and abstraction controls and monitoring, or site-level governance procedures. Water stewardship goes further to incorporate data collection, planning and actions that engage and align with other water users sharing a site's resources.

**AWS DEFINES WATER STEWARDSHIP AS:**

**The use of water that is socially and culturally equitable, environmentally sustainable, and economically beneficial, achieved through a stakeholder-inclusive process that includes both site- and catchment-based actions.**

Farmers and site managers know their sites and practices in great depth. The majority also understand their local hydrological context. It is less common for them to be familiar with the links between the site and its surrounding landscape, or the other stakeholders within the catchment. How water is managed at catchment-level or around ecosystems or protected areas is commonly assumed to be in the hands of water authorities or administrators. The influence that one site, or a small number of sites, may have on the wider catchment is often not perceived as relevant and can result in little interest for taking collective action to address catchment-level issues.

Catchment management from a regulatory point of view (River Basin Authorities and Management Plans (RBMPs) in Spain), is different to the water stewardship approach proposed by the AWS Standard. The ultimate goal of water stewardship is for sites to work in conjunction with other water-related stakeholders and engage in collective action that aligns with RBMPs (such as achieving 'good' water body status) and other catchment-level activities. Due to the strong hold of international markets on Spanish agriculture and the influence they have on local water resource management, the entire value chain also needs to be considered.

In agricultural locations with high water risks (which are many in the case of Spain), the challenges are a complex mix that includes water balance and abstraction, water quality, governance and ecosystem health. Solutions to such challenges require collective responses from within the catchment – that is, a robust water stewardship strategy.

## GOOD WATER MANAGEMENT

**FOCUSES WITHIN A SITE AND INCLUDES:**

- Pollution and abstraction measures
- Internal governance
- Legal compliance
- Ensuring adequate access to water, sanitation and hygiene facilities for all workers

## GOOD WATER STEWARDSHIP

**BUILDS OUTWARDS FROM WATER MANAGEMENT AND INCLUDES:**

- Data collection, planning and actions involve engagement and alignment with other water users that share the same water resources
- Collective actions by sites with other water-related stakeholders
- Alignment with basin water plans and other local consensus
- Context-based activities beyond the site at the scale of the catchment

Diagram 2: Water management v water stewardship

# AWS AND COMMON AGRICULTURAL STANDARDS

If a site is implementing an agricultural standard that includes requirements on legality or on-site water management, it may already fulfil some of the criteria in the AWS Standard. Legal water permits, water consumption records and quality management measures are typical elements required by most common agricultural standards. However, although having these factors in place can avoid duplicating work and speed up AWS implementation, the AWS Standard has no official benchmark, alignment or agreements with any other current standards, so all indicators need to be completed and verified within the AWS Standard System.

In general, common agricultural standards focus on on-site water management, with occasional requirements beyond site boundaries. They do not normally include extensive requirements for contextual information, water risks or collective action for tackling shared water challenges at catchment-level, as found in the AWS Standard[11]. By identifying the intersections of the AWS Standard with other agriculture standards, it is possible to create a pathway that takes good on-site water management and advances it to catchment-level water stewardship. Determining these intersections is beyond the scope of this report, but it is important to consider how any work already conducted as part of other standard schemes may be applicable for the AWS Standard.

# AWS CRITERIA AND INDICATORS

This resource is based on the AWS Standard V 2.0 criteria and indicators and adheres to the AWS General Guidance. The document follows the five steps of the AWS Standard (see Diagram 3) and provides insights and useful information to help implement the AWS Standard in the Spanish agricultural context. Not all criteria have been included as many are already covered by existing guidance documents. This resource, instead, focuses on specific indicators that are particularly important for understanding how to implement the AWS Standard in Spanish agricultural value chains.

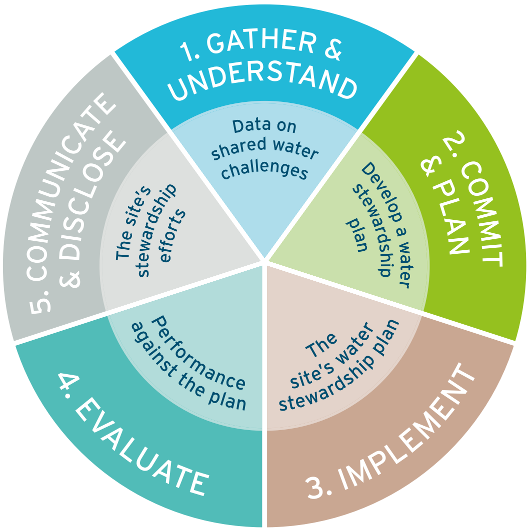


Diagram 3: AWS Standard five-step framework

**The AWS Standard is a site-based management system. It is presented from the perspective of a single location but there are three types of AWS Standard certification:**

## SINGLE SITE

One contiguous site which the implementing organisation owns and carries out its principal activities which are homogenous across the entire site, for example, farm or factory.

## MULTI-SITE

Where two or more sites are located within the same catchment, operate under a single management system, and follow homogenous production processes. The sites could be owned by one or multiple entities.

## GROUP

Where two or more sites are located within the same catchment, are part of a Group Member Agreement, and operate an Internal Control System. Sites in a Group Operation must have homogenous production and carry out annual internal audits. The sites could be owned by one or multiple entities.

# STEP 1: GATHER AND UNDERSTAND

## CRITERION 1.1: GATHER INFORMATION TO DEFINE THE SITE'S PHYSICAL SCOPE FOR WATER STEWARDSHIP

Defining and understanding the physical scope of a site is fundamental to the water stewardship process. Collecting data, assessing relevant risks and identifying key stakeholders all helps to define geographic boundaries. It can also inform subsequent action planning and implementation, as well as stakeholder engagement. Gathering detailed information will provide a greater understanding of agricultural practice and knowledge of where to find relevant data.

The first step is to map a site's boundaries and water infrastructure. In agriculture, these are often on-site reservoirs (balsas de agua), wells, hydrants and the irrigation network. The next step is to locate and identify any water source(s). It is quite common for irrigation water to be provided to sites through irrigation canals or pipes from far away. In Spain, this is usually managed through self-organised Irrigation Communities that follow water authority regulations and only distribute water rights to farmers that agree to their terms. There are more than 350 Irrigation Communities in the country[12]. Identifying the catchment for a site is therefore key. If a site is linked to an Irrigation Community, identifying the catchment or groundwater source of origin is also important as these can sometimes be in a different catchment or even a different River Basin District.

Diagram 4: Simple catchment map


Figure 1. Spanish River Basin Districts. Inter-communitary basins (yellow) are those covering more than one region (comunidad autónoma), and managed by a River Basin Authority (Confederación Hidrográfica). Intra-communitary basins (pink) are located entirely within one region and are managed by the corresponding regional government. Source: Author's elaboration with data from MITERD[15].

The catchment area should be 'manageable' for stakeholders. It should only include water bodies and landscapes that can be measured and monitored and that offer the greatest potential for successful action planning and implementation. Internal sub-basin divisions within Spanish River Basin Districts can be useful guides for this. Spanish sub-basin sizes can vary but the average is around 200km2. For example, the Guadalquivir Basin is 57.527km2 and divided into more than 400 sub-basins.

Physical scope is not just restricted to catchment and hydrological information. It is also necessary to identify and map any geographic areas in which the site and its stakeholders may have or receive any influence. These will mainly be agricultural regions (comarcas agrarias), agrarian demand units, exploitation systems (juntas/sistemas de explotación), key ecosystems and protected areas, and administrative divisions[13]. These all provide useful information for other AWS Standard criteria such as stakeholder identification and engagement (1.2), water infrastructure (1.5), Important Water-Related Areas (IWRAs) (1.5), and water availability and demands (1.3).

Some key resources exist to help identify this geographical information in Spain. For hydrological data, River Basin Districts (see Figure 1), groundwater management bodies and internal sub-basin delineations should all be consulted. Geospatial datasets and viewers are available for download from each River Basin District website (see Annex 1), and the Spanish Ministry for Ecological Transition and Demographic Challenge (MITERD)[14]. Geographic information should be represented in relation to the site and maps produced using Geographic Information System (GIS) software.

## CRITERION 1.2: RECOGNISE RELEVANT STAKEHOLDERS

The links between agriculture and water are particularly relevant in Spain. On average, agriculture takes up to 70% of water consumption globally, but in Spain the average is 80% and, in some basins, it reaches more than 85%[16]. This high level of water consumption for agriculture, together with common water-related challenges shared with other sectors and ecosystems (water scarcity, droughts, floods, pollution, climate change impacts, infrastructure regulations, etc.) makes it even more important to understand and consult with a wide range of stakeholders who represent different views and concerns around water. Relevant stakeholders will be identified when defining the site's physical scope.

**Typical stakeholders in the Spanish agricultural context include:**

- Farmers and farmers' organisations cooperatives
- Irrigation Communities
- River Basin/water Authorities
- Conservation organisations (for example, World Wide Fund for Nature (WWF) Spain)
- Supply chain partners
- Civil society groups
- Special interest groups (water-related associations, ecosystem protection groups)
- Local experts/academia, representatives of existing water-related initiatives

## CITERION 1.3: GATHER WATER-RELATED DATA FOR THE SITE

Site water balance (AWS Standard Indicators 1.3.2 and 1.3.3) is the most important data to gather for any agricultural site. The water balance is an equation based on assessment of water inflows, outflows, onsite water storage and changes in storage. For agriculture, there are additional components that need to be considered, as shown in Figure 2.

The site water balance is based on an assessment of how much water crops need in order to determine irrigation requirements. It depends on factors such as climate, soil, type of crop, crop cycle, etcetera. It also varies throughout the year, especially in countries with strong seasonal precipitation variability, like Spain. Site water balance is assessed against the catchment water balance. By considering both balances it is possible to identify the availability/demand challenges across the year and set targets and plan actions at site and catchment-level.

To comply with AWS Standard criteria, each component of the site water balance needs to be properly quantified. This includes gathering data on climatic components such as precipitation, reference evapotranspiration and irrigation application (if it takes place). For this, flow metres can be used to measure irrigation application to the crops on a daily basis. Irrigation volumes also need to be gathered as evidence for legal compliance with the water allocation/concession from the corresponding water authority.

Once this data has been collected, there are different methodologies, technologies and models used to identify crop water requirements and calculate site water balances. Many irrigation service providers (smart irrigation systems, soil moisture sensors, tensiometers, etc.) commonly used in Spanish agriculture also provide support for site water balance calculations. Some Irrigation Communities will also provide sites with irrigation recommendations or climatic data. The Spanish Ministry of Agriculture recommends using the public service Agroclimatic Information System for irrigation (SIAR)[17]. This provides access to climatic datasets and irrigation water needs as well as other useful data on water balance components.

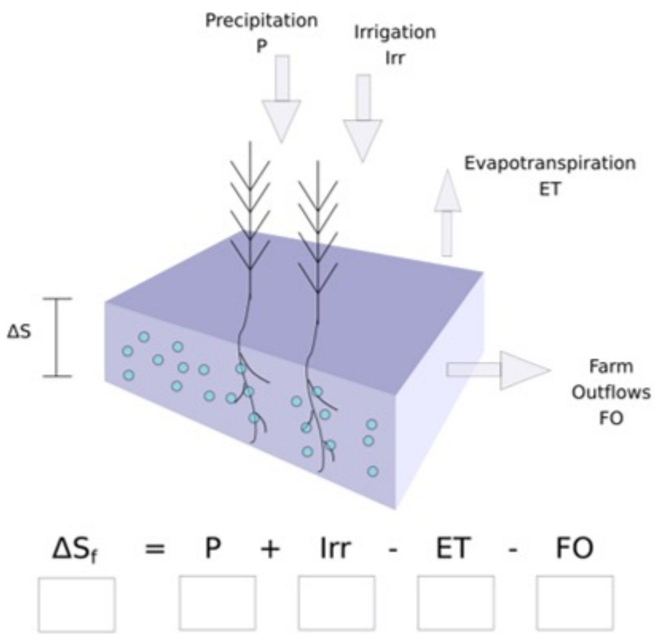


Figure 2. Site water balance components. Source: Good stuff International adapted from FAO-56 report

## CRITERION 1.4: GATHER DATA ON THE SITE'S INDIRECT WATER USE

Good water stewardship also identifies and gathers data on indirect water use and water risks associated with the primary inputs supplied to the site. However, for agriculture, the primary input is water and therefore the situation, associated risks and challenges are already covered in the water-related criteria for the site and catchment, along with any subsequent action plans. It is only for Advanced Indicator 1.4.3 that embedded water use of primary inputs needs to be quantified.

Common agricultural inputs, such as fertilisers or pesticides, should be identified and their use quantified. However, their associated water use and risks need only be identified if they represent more than 5% of production cost. Gathering as much detail as possible about secondary inputs is important because a reduction in their use can lead to a decline in embedded water use and a reduction in on-site sources of pollution.

Conducting a detailed water footprint assessment provides crucial information for determining a site's total water balance. It also supports target-setting which can then be included as quantifiable metrics in a water stewardship plan. The information is also useful for key stakeholders, such as supply chain partners, who can use the information as a measure of their indirect water use. This makes it a valuable asset for fostering stakeholder engagement in water stewardship.

## CRITERION 1.5: GATHER WATER-RELATED DATA FOR THE CATCHMENT

AWS Standard Criterion 1.5 requires information to be gathered about a site's catchment in relation to water governance, water-related legal and regulatory requirements, water balance, water quality and Important Water Related Areas (IWRAs). A meaningful water stewardship plan can only be developed by fully understanding the entire catchment context. The following section breaks down the indicators for Criterion 1.5 and points to resources that can help with gathering the necessary information.

### 1.5.1. WATER GOVERNANCE

In Spain, water resource planning based on River Basin Districts (confederaciones hidrográficas, see Figure 1) was formally instituted in the Water Act of 1985 (Ley de Aguas de 1985). River Basin Authorities and Management Plans (RBMPs) are the main governance documents that set rules for water use and demands, and environmental flows. They define the status of water bodies and set objectives and plans/programmes for reaching 'good' status. They also include future scenarios that consider the potential impacts of infrastructure work, changes in policies and other possible activities. It is important to identify the River Basin District in which a site is located (and the one where the water source(s) originates in the case of inter-basin transfers) and become familiar with its RBMPs. A list of the different River Basin Districts and links to their RBMPs can be found in Annex 1.

Inter-Communitary Basins are those covering more than one region (Comunidad Autónoma) and are managed by a River Basin Authority (Confederación Hidrográfica). Intra-Communitary Basins are located entirely within one region and are managed by the corresponding regional government. However, some factors related to water, land use and the environment may be looked after by regional administrations. It is important to identify the corresponding government departments within a site region and to become familiar with the areas related to water, biodiversity and climate change that are managed by the National Ministry for Ecological Transition and Demographic Challenge (MITERD)[18]. The Ministry of Agriculture provides a lot of datasets, regulations and useful information[19].

### 1.5.2. WATER-RELATED LEGAL AND REGULATORY REQUIREMENTS

RBMP archives can be consulted for regulations applicable to a particular site. The most important legal requirements for Spanish agriculture relates to water concessions and their limits (which may change from year to year under drought or scarcity situations), and abstraction permits in the case of direct withdrawals from rivers, lakes and, in particular, aquifers. Other aspects that must be complied with include protection of public water domains, the nitrate directive, soil and land authorised uses, and agricultural waste laws[20]. In some cases there are also Special Plans that set specific rules. The Special Plan for the management of areas with irrigated crops located north of Doñana National Park is one example. It provides specific tools, such as an online viewer, to determine whether or not a site is located in an agricultural or irrigated-permitted area[21]. WWF Spain's guide to verifying water use in agriculture is also useful for this[22].

### 1.5.3. CATCHMENT WATER BALANCE

The catchment water balance provides essential quantitative data to describe the water situation in a catchment. The information is included in water risk assessments and can be used to define opportunities for improving water use, setting water targets for a water stewardship plan and site-level water reporting. It is therefore a key element in water stewardship.

The AWS General Guidance emphasises the importance of identifying different components of the water balance equation:

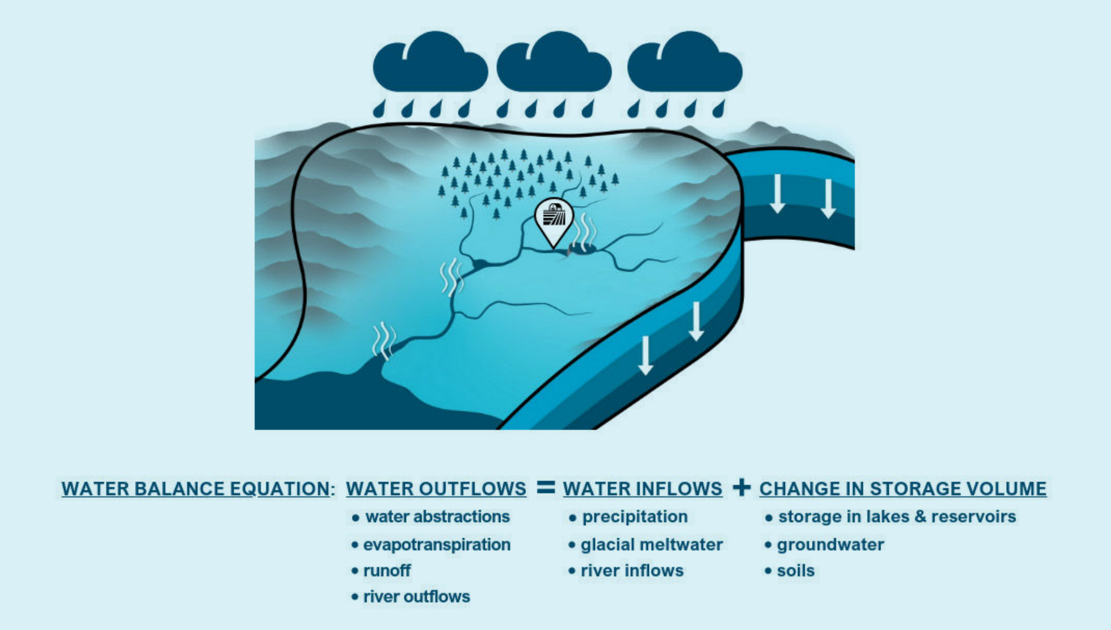


Diagram 5: Calculating a water balance

The Baseline Water Stress (BWS) indicator provided by the World Resources Institute (WRI) and included in the WWF Water Risk Filter can be used to get an idea of water availability in relation to demands at catchment-level[23,24]. However, although these indicators may serve for risk screening purposes, they have limitations when calculating a catchment water balance because they are usually given as static figures based on historical datasets. In order to get more precise and realistic catchment water balances, local data should be used. Most of this can be found in RBMPs and sources such as the Water Extraction Index (WEI+)[25].

Time scale also needs to be considered for workable catchment water balances. In countries like Spain where seasonal variances are pronounced, if a water balance is conducted yearly, then important effects of water availability related to seasonal or monthly water consumption will remain invisible. Creating monthly water balances using the best possible time-space resolution will better inform sustainable water management and water targets and actions[26].

In addition to the datasets found in RBMPs there are several sources for water balance components with appropriate time-space resolutions. These include the following:

- Hydrological Confederations' Automatic Hydrological Information System (SAIH)[27]
- Agroclimatic Information System for Irrigation (SIAR)[28]
- Monitoring network of MITERD[29]
- MITERD's Hydrological Water Bulletin[30]

Local authorities, remote sensing tools and climatic stations can also be good sources of information.

## 1.5.4 CATCHMENT WATER QUALITY

When it comes to catchment-level water quality, it is important to set a baseline and then plan and implement appropriate actions to improve it. RBMP's plans and programmes website provides useful water quality datasets for each water body[31]. The Water Information System for Europe (WISE) is also useful and compiles the status of all surface and groundwater bodies as reported by EU members in accordance with the Water Framework Directive[32,33]. In the agricultural context it is also important to know whether a site is located in a nitrate vulnerable area[34]. These are areas in which runoff may contain nitrates from agricultural activities that can affect water bodies and where regional administrations set limitations on total nitrate applications. If a site is located in a nitrate vulnerable area, limitations need to be included in the legal compliance and set as a target in water stewardship plans. Information on the nitrate load originating from agricultural sources per water body is published by MITERD[35].

## 1.5.5 CATCHMENT IMPORTANT WATER-RELATED AREAS (IWRAS)

The location of a site in relation to IWRAs can be found on a number of websites including:

- MITERD's Natural Protected Areas datasets and Geographic Viewer[36]
- European Protected Sites dataset[37]
- Natura 2000 Network Viewer[38]
- World Database on Protected Areas[39]

Local stakeholders and relevant Non-Governmental Organisations (NGOs) such as WWF and local environmental associations, can also help identify IWRAs and their status. This can help sites engage with NGOs and trigger opportunities for collective action to protect and improve IWRAs.

## CRITERION 1.6: UNDERSTAND CURRENT AND FUTURE SHARED WATER CHALLENGES IN THE CATCHMENT

Shared challenges represent an opportunity to promote stakeholder engagement and collective action, as well as guide actions for a water stewardship plan. Sites will face different types of challenges depending on the local context, but in the Spanish agricultural sector, common challenges are around current and future water availability and quality.

Being aware of and regularly checking the climatic drought and scarcity status is important as these can determine water availability in the near future and influence the decisions of water authorities on water concessions. It can also help sites to anticipate irrigation plans. All River Basin Authorities publish monthly reports on drought and scarcity status (see Annex 1). MITERD publishes monthly reports and maps along with their weekly Hydrological Bulletin with data on water availability and trends[40]. Their Hydrologic Bulletin Dashboard also has different time-space scales[41].

Climate change is one of the main challenges facing water users in Spain, particularly in the agricultural sector. Some studies point to a 10% – 20% reduction in water availability in some basins in south-eastern Spain due to increasing temperatures, evapotranspiration and reduced precipitation[42,43,44]. Datasets in the WWF Water Risk Filter can help better understand the current situation[45]. Agricultural producers in Spain can also access the National Climate Change Adaptation Platform which has links to resources and current initiatives[46]. It also has an interactive viewer that can help understand local climatic scenarios[47].

Water quality is another important aspect to consider. More than 40% of surface and groundwater bodies in Spain still have 'bad' water quality status. Most agricultural areas in Spain are in nitrate vulnerable areas where nitrates originate from agricultural activities[48]. There are also a large number of water bodies affected by nitrate concentrations beyond agreed limits, a result of diffuse pollution from agricultural activity [49,50]. This poses a real challenge because high nitrate loads in irrigation water can affect soils, runoff and potentially pollute water bodies and associated ecosystems. New regulations are being developed to address this issue so it will become a key factor for future catchment health and for safeguarding the resilience of future agricultural activity.

An often overlooked shared challenge, and one that can have a large impact on water resilience, is catchment governance. In Spanish agriculture, water governance poses several issues. For example, some tasks that comply with Water Framework Directive objectives can also conflict with those aimed at meeting irrigation demands. Likewise, governance systems do not ensure transparency in some key areas, such as environmental flow monitoring or water rights, and fail to effectively enforce regulations. Water Stewardship should stimulate good water governance. Sites should identify larger catchment objectives and find space to foster transparent stakeholder interactions by avoiding conflicting positions and advocating, together with value chain partners and key local stakeholders, for better catchment governance. The Green Book on Water Governance, published by MITERD in 2020, is a recommended resource for understanding how to collaboratively construct new water governance models that tackle existing and future challenges in water management[51]. Sharing information with local stakeholders, such as Irrigation Communities, local interest groups or NGOs, may also provide opportunities to engage on shared water challenge initiatives.

## CRITERION 1.7: UNDERSTAND THE SITE'S WATER RISKS AND OPPORTUNITIES

For risk assessment tools, the AWS General Guidance suggests the WRI Aqueduct or the WWF Water Risk Filter, which provide global datasets on different water risk categories[52]. The WWF Water Risk Filter is useful because it has high-resolution versions for Europe and Spain[53,54]. These include data on different risk categories from European or national sources (e.g., aridity levels and ecological status of surface water bodies), RBMPs, MITERD and the European Joint Research Centre. These high-resolution tools provide more context-based datasets with higher granular resolution that give a realistic, detailed picture of the local water situation. The data they provide is suitable for the water risk assessments required for AWS Standard Criterion 1.7.

Information from high resolution risk assessment tools such as the WWF Water Risk Filter can be combined with local, up-to-date information from RBMPs and other relevant sources. The RBMPs cover aspects of water availability and climate change found in AWS Standard Indicator 1.6, and catchment-related information relevant to Indicator 1.5. This data will create a more detailed picture of a site's water risk and help define actions for a water stewardship plan. However, risks are ultimately contextual and even the most up-to-date, high-resolution datasets do not show how risks manifest in the local context. Information gathered for AWS Standard Indicators 1.2 (stakeholder engagement), 1.3 (site data) and 1.5 (catchment data) should also be used to inform assessments of water risks and opportunities.

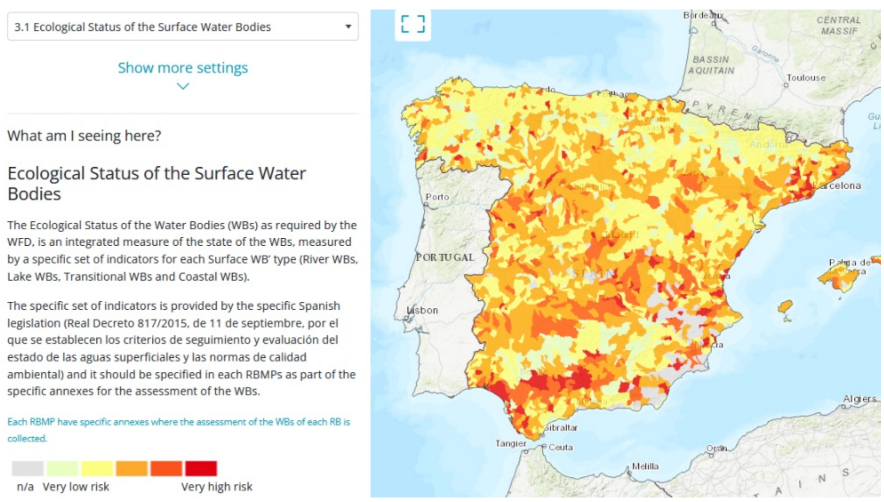

Figure 3. WWF Water Risk Filter - Ecological Status of Surface Water Bodies in Spain

## CRITERION 1.8: UNDERSTAND BEST PRACTICE TOWARDS ACHIEVING AWS OUTCOMES


Diagram 6: Five intended outcomes of the AWS Standard

As the AWS Standard is applicable to all sectors and industries, it cannot be prescriptive about best practice. The AWS General Guidance describes best practice as a 'range of possibilities' that are situation-specific and include a variety of methods. The Standard specifies that practices should contribute to achieving intended outcomes, with particular emphasis on those identified as priorities within the catchment.

Consultation with key stakeholders such as Irrigation Communities, farmers' associations, academia, NGOs or local administrations may offer opportunities to learn about best agricultural or water-related practice, along with initiatives and projects for specific regions or crops. Facilitating multi-stakeholder meetings for knowledge sharing is useful to help identify and support water governance under AWS Standard Indicator 1.8.1. Contributing to multi-stakeholder governance platforms is also good practice, providing they are neither politically sensitive nor promoting actions with potential impacts on ecosystems or the water balance of a catchment (or neighbour catchments in the case of inter-basin transfers).

As water risks in Spain mainly relate to water scarcity, sites tend to focus on achieving best practice for water balance and improving efficiency. These practices are linked to AWS Standard Indicator 1.8.2. and may also be used for the site water balance assessments in AWS Standard Indicators 1.3.2 and 1.3.3. Practices may involve flow metres, soil moisture sensors, tensiometers or fertigation systems for applying the right amount of water and fertilisers to crops and avoiding water loss. These devices can be combined with other technologies such as remote sensing to monitor soil moisture and vegetation vigour, as well as methodologies such as water footprint assessments. By studying in detail how much water is used by crops, stronger criteria can be established for how and when to irrigate. Detailed information about the amount of water needed per unit of crop produced can also help plan reduction targets.

Common best practice in agriculture can relate to more than one outcome. For example, implementing soil protection measures, increasing organic matter, creating ecological buffer zones or implementing biological control measures. These practices support and promote biodiversity and improve IWRAs on a site and its surroundings. They can also support water balance and water quality as they help water retention and reduce the use of agrochemicals that can potentially impact adjacent water bodies.

Although it is clear that good on-site practice is important, it is not sufficient for managing the high-water risks found in Spain. It is therefore necessary to widen the scope of good practice and promote collective action to protect or restore IWRAs, share knowledge about good on-site practice, foster transparency and collaboration with administrations, and participate in local water governance together with water users associations, NGOs or Irrigation Communities.

Diagram 7: Catchment stakeholder engagement

# STEP 2: COMMIT AND PLAN

## CRITERION 2.2: DEVELOP AND DOCUMENT A PROCESS TO ACHIEVE AND MAINTAIN LEGAL AND REGULATORY COMPLIANCE

It is important to develop a process to meet legal and regulatory requirements that is consistent and specifies details on how best to comply with regulations. This can include gathering irrigation records to prove compliance with maximum water concessions, tracking nutrient applications to show compliance with maximum nitrate application, consulting cadastral websites to identify agricultural parcels and permitted uses, or using tools to verify the legality of water sources. There may be cases in which a site has water use permission but also has illegal wells, or where water consumption volume surpasses the maximum volume permitted. Having a transparent system in which any detail can be verified from official sources is therefore key.

## CRITERION 2.3: CREATE A WATER STEWARDSHIP STRATEGY AND PLAN

AWS Standard Advanced Indicator 2.3.3 on promoting partnerships and collective action is key for any water stewardship plan, regardless of certification type (core, gold, platinum). In the Spanish agricultural sector there is a strong need for collaboration in relation to water, so any realistic potential collective actions should be included in plans. It may not be possible to implement ambitious stakeholder engagement and collective action in the first or second year of a water stewardship journey, but steps can definitely be taken in that direction. Potential actions, in line with Step 1 of the stewardship process, can include:

- Implementing technologies and methodologies to measure and monitor water use and increase efficiency.
- Producing water balance studies to assess the amount of water required to produce a unit of crop.
- Setting water consumption targets based on legal concessions and expected reductions in water availability due to climate change.
- Measuring and monitoring nitrate application and setting targets to comply with nitrate vulnerable area limitations.
- Measuring and monitoring soil organic matter and implementing actions and objectives to increase it.
- Implementing a biodiversity plan to promote and monitor insects and other species on the site and surrounding landscapes.
- Engaging with or promoting initiatives that allow good practice knowledge to be shared on irrigation and ecosystem protection or restoration.
- Collaborating with NGOs and water authorities to promote legal transparency and fight illegal water practices.
- Promoting multi-stakeholder dialogue on good practice to help improve water body status in line with the Water Framework Directive or objectives for climate change adaptation strategies[55].
- Initiating restorative actions for the landscape in collaboration with other relevant stakeholders.

## CRITERION 2.4: DEMONSTRATE THE SITE'S RESPONSIVENESS AND RESILIENCE TO RESPOND TO WATER RISKS

As set out in the AWS General Guidance, AWS Standard Criterion 2.4 can be combined with information from Criterion 1.7. Stakeholder engagement is fundamental to this criterion. Sharing information with other farmers in the catchment as well as local authorities, Irrigation Communities and NGOs, can identify shared risks and concerns, and can help understand the measures taken by different stakeholders.

More specifically, AWS Standard Advanced Indicator 2.4.2, which refers to climate change, offers an opportunity to incorporate insights from experts or public sector agencies to better understand the impacts of climate change on catchment activities and to design adaptation strategies for inclusion as concrete actions in a water stewardship plan.

# STEP 3: IMPLEMENT

Step 3 is to provide evidence that demonstrates a water stewardship plan has met the different AWS outcomes. For example, providing evidence of compliance with targets for water consumption, nitrate application or biodiversity protection and linking them to outcomes on water balance, water quality or IWRAs, respectively. This step is also about providing evidence of participation in catchment governance and legal compliance.

## CRITERION 3.1: IMPLEMENT PLAN TO PARTICIPATE POSITIVELY IN CATCHMENT GOVERNANCE

In Step 1 of the water stewardship process, key stakeholders are identified. In Step 2, interaction with these stakeholders is key to gathering information about risks and challenges and to fostering collective action around, for example, knowledge sharing initiatives, restoration activities or design of climate change adaptation strategies. However, stakeholder engagement processes can be slow and it is not always easy to engage actors in open dialogue when they have differing views on water issues. AWS Standard Criterion 3.1 defines how this water dialogue will take place – the type of interaction, the organisations to include, the tools to use and how a site intends to contribute to supporting local governance.

Stakeholder engagement is not a natural practice in the Spanish agricultural sector. The relationship between farmers and water authorities and governments is purely administrative. Participation in catchment governance is a challenge for single farmers. However, sharing information with other farmers in the local context, as well as local associations or Irrigation Communities, can create a space for dialogue. This can be done through regular local meetings or workshops, by sharing materials on local communication channels, or engaging with local associations, NGOs or municipalities.

Compliance with AWS Standard Criterion 3.1 will also lay the ground for an effective stakeholder engagement process that leads to the collective actions required in AWS Standard Advanced Indicators 3.9.11, 3.9.12 and 3.9.13. It will also help meet the requirements for communication and disclosure in Step 5.

## CRITERION 3.2: IMPLEMENT SYSTEM TO COMPLY WITH WATER-RELATED LEGAL AND REGULATORY REQUIREMENTS AND RESPECT WATER RIGHTS

For AWS Standard Criterion 3.2, a site needs to provide evidence to demonstrate compliance in line with the legal requirements defined in Step 1 and the process defined in Step 2. As with previous steps, the WWF guide to verifying legal water use in agriculture is useful[56]. It helps to understand how different types of documents can be used as evidence of compliance with requirements on water or land use, as well as how to verify them using public tools and field visits.

Agricultural lands in lower Guadalquivir valley. Credit: Alex F. Poulussen - Good Stuff International

# STEP 4: EVALUATE

In Step 4 a site is required to evaluate performance against the targets set in their water stewardship plan. In other words, to consider whether water targets were met or not. It may be that a site had a target to reduce water consumption to 10% below the maximum level permitted and, because it was a rainy year, the objective was easy to meet. However, it might also be that the water authority established reductions in their water allocations, making it impossible to reach the 10% reduction target.

In all cases, targets can be evaluated and re-assessed for subsequent years. A site can also identify how actions and measures have created value for the wider catchment. Using the water consumption reduction example above, the 10% not consumed by the site would remain in a reservoir, river or groundwater body, and a site would have contributed to improving the water quantity status or to meeting environmental flow requirements.

In practical terms, site managers and those implementing the actions that will achieve objectives (site operations managers, technicians, etc.), need to meet to evaluate whether objectives have been met or not. They can then assess the difficulties of implementing certain actions and find opportunities to improve upon them in subsequent water stewardship plans.

# STEP 5: COMMUNICATE AND DISCLOSE

The AWS General Guidance emphasises the importance of engaging stakeholders in the water stewardship process. A single site or group of sites may not feel they have the capacity to influence governance or bring different actors together. Creating an atmosphere of collaboration within the catchment is therefore important and there will be different ways of doing this depending on the context. For example, sharing information with local stakeholders, meeting with stakeholders individually, or sharing actions through local communication channels or social media. However, the most efficient method is to gather people in a room and discuss water topics that concern them all. This might initially be a meeting or workshop with a small group of local farmers or Irrigation Communities.

To help assemble people, it is important to get support from local associations, companies, Irrigation Communities, municipalities, NGOs, etc. If an international value chain is one of the stakeholders (for example, a brand or food manufacturer) their presence could motivate local actors to engage. Meetings can take place online or in person. Sharing information on catchment status, challenges and opportunities will give everyone a chance to share their views and concerns around water issues in an apolitical and friendly context.

Meetings could be held annually. This would cover other AWS Standard Indicators including: sharing a site's water stewardship plan and actions (5.2.1), measures taken to reach targets (5.3.1) and sharing water challenges and identified risks with relevant stakeholders (5.4.1). It is also an opportunity to trigger discussions about how these risks and challenges can be managed collectively. Promoting these kinds of meetings also covers AWS Standard Indicator 5.4.2 as they are a clear effort by a site to engage stakeholders and coordinate and support public sector initiatives (for example, efforts to achieve 'good' water body status in line with RBMP objectives and plans).

Knowledge sharing can help foster a common vision for a catchment. It can result in others learning and replicating good practice (for example, identifying key restoration areas, connecting different water-related initiatives, etc.), that has a positive impact at catchment-level. Even if a first meeting has little outreach, it is good to continue making the effort to invite stakeholders and hold regular meetings in order to create solid local networks. This will encourage sites or groups of sites to communicate and share their water stewardship efforts and could positively influence local water governance.

# CONCLUSION AND NEXT STEPS

This document has aimed to give some insight into the intricacies of implementing water stewardship in agricultural contexts throughout Spain. As set out above, there are many contextual nuances that need to be addressed appropriately if water stewardship interventions are to be effective.

The AWS Standard System Training is a way to get a deeper understanding of water stewardship[57]. It is also useful for meeting other water stewardship practitioners whilst learning about the purpose and process of the AWS Standard.

There are many additional tools and resources on the AWS Tools Hub – an online knowledge and learning centre[58]. It hosts an ever-expanding library of learning modules, webinars and interactive tools that have all been designed to make implementing the AWS Standard a smoother process. The Tools Hub is free for staff at AWS Member organisations, and accessible with a pay-as-you-go subscription service for staff at non-Member organisations. Learn more about the AWS Tools Hub at tools.a4ws.org

Organisations that become Members of AWS demonstrate a commitment to water stewardship and formally join a network of practitioners who are advancing water stewardship around the globe. As stakeholder engagement is a core part of the process, many opportunities are organised for Members to engage and network. For example, staff at Member organisations receive free tickets to the annual AWS Global Water Stewardship Forum that brings together a wide variety of stakeholders for the sole purpose of advancing water stewardship and the AWS Standard.

AWS also hosts a global agriculture working group which meets quarterly and is a convening space for implementers to exchange knowledge and learning with each other.

Learn more about AWS at a4ws.org and contact us at a4ws.org/contact

# ANNEX 1

The table below provides links to current and past River Basin Management Plans (RBMPs), geospatial data infrastructure and viewers to access and download geographic information on different river basins in Spain.

| RIVER BASIN DISTRICT | | RIVER BASIN MANAGEMENT PLANS | SPATIAL DATA INFRASTRUCTURE / GEOGRAPHIC VIEWERS |
|---|---|---|---|
| EASTERN CANTABRIAN | STATE | https://www.chcantabrico.es/parte-espaniola-de-la-dhc-oriental | https://www.chcantabrico.es/servicios/informacion-cartografica-documentacion |
| | BASQUE COUNTRY | www.uragentzia.euskadi.eus | https://www.uragentzia.euskadi.eus/visor-de-informacion-geografica-de-la-agencia-vasca-del-agua/webura00-minima/es/ |
| WESTERN CANTABRIAN | | https://www.chcantabrico.es/dhc-occidental | https://www.chcantabrico.es/servicios/informacion-cartografica-documentacion |
| GALICIA-COAST | | https://augasdegalicia.xunta.gal/tema/c/Planificacion_hidroloxica | http://mapas.xunta.gal/visores/dhgc/ |
| MIÑO-SIL | | https://www.chminosil.es/es/chms/planificacionhidrologica | https://www.chminosil.es/es/ide-mino-sil |
| DOURO | | https://www.chduero.es/web/guest/planificacion | http://www.mirame.chduero.es/DMADuero_09/index.faces |
| TAGUS | | http://www.chtajo.es/LaCuenca/Planes/PlanHidrologico/Paginas/default.aspx | http://www.chtajo.es/LaCuenca/Paginas/InforGeografica.aspx |
| GUADIANA | | https://www.chguadiana.es/planificacion/plan-hidrologico-de-la-demarcacion/ciclo-de-planificacion-2015-2021-vigente/documentos-del-plan-hidrologico | https://www.chguadiana.es/cuenca-hidrografica/informacion-cartografica/geoportal |
| TINTO, ODIEL AND PIEDRAS | | https://www.juntadeandalucia.es/medioambiente/portal/landing-page/-/asset_publisher/4V1kD5gLiJkq/content/plan-hidrol-c3-b3gico-del-tinto-odiel-y-piedras-2015-2021/20151 | https://portalrediam.cica.es/VisorRediam/?conf=/configvisor/visorPlanesHidrologicos/tinto_odiel_piedras_validate.json |
| GUADALQUIVIR | | https://www.chguadalquivir.es/demarcacion-hidrografica-guadalquivir | https://idechg.chguadalquivir.es/nodo/index.html |
| GUADALETE AND BARBATE | | https://www.juntadeandalucia.es/medioambiente/portal/landing-page/-/asset_publisher/4V1kD5gLiJkq/content/plan-hidrol-c3-b3gico-del-guadalete-barbate-2015-2021/20151 | https://portalrediam.cica.es/VisorRediam/?conf=/configvisor/visorPlanesHidrologicos/guadalete_barbate_new.json |
| ANDALUSIAN MEDITERRANEAN BASINS | | https://www.juntadeandalucia.es/medioambiente/portal/landing-page/-/asset_publisher/4V1kD5gLiJkq/content/plan-hidrol-c3-b3gico-del-guadalete-barbate-2015-2021/20151 | https://portalrediam.cica.es/VisorRediam/?conf=/configvisor/visorPlanesHidrologicos/guadalete_barbate_new.json |
| SEGURA | | https://www.chsegura.es/es/cuenca/planificacion/ | https://www.chsegura.es/portalchsic/apps/storymaps/stories/90df2390f6c64fadbce3c5204d6b57dc |
| JUCAR | | https://www.chj.es/es-es/medioambiente/planificacionhidrologica/Paginas/Indice-Planificacion-hidrologica.aspx | https://www.chj.es/es-es/medioambiente/sistemasdeinformacion/Paginas/Sistemasdeinformacion.aspx |
| EBRO | | https://www.chebro.es/web/guest/planificacion | http://iber.chebro.es/geoportal/ |
| CATALONIA | | https://aca.gencat.cat/es/plans-i-programes/pla-de-gestio/ | https://aca.gencat.cat/es/laigua/consulta-de-dades/descarrega-cartografica/ |
| BALEARIC ISLANDS | | https://www.caib.es/sites/aigua/es/planificacio_hidrologica/ | http://www.caib.es/sites/sitibsa/es/ideib-81258/ |
| MELILLA | | https://www.chguadalquivir.es/demarcacion-hidrografica-melilla | https://idechg.chguadalquivir.es/nodo/index.html |
| CEUTA | | https://www.chguadalquivir.es/demarcacion-hidrografica-ceuta | |

| SCOPE | RIVER BASIN MANAGEMENT PLANS | SPATIAL DATA INFRASTRUCTURE / GEOGRAPHIC VIEWERS |
|---|---|---|
| LANZAROTE | https://aguaslanzarote.com/wps/normativa/ | https://www.idecanarias.es/ |
| FUERTEVENTURA | http://www.aguasfuerteventura.com/plan2015_2021.php | |
| GRAN CANARIA | www.aguasgrancanaria.com | |
| TENERIFE | https://www.aguastenerife.org/index.php?option=com_content&view=article&id=138&Itemid=1675 | |
| LA GOMERA | https://aguasgomera.es/planificacion-hidrologica/ | |
| LA PALMA | https://lapalmaaguas.com/planificacion/planificacion-hidrologica/ | |
| EL HIERRO | http://www.aguaselhierro.org/planificacion/plan | |

## USEFUL WEBSITES

- Spanish Water Management System
- Ministry for the Ecological Transition and Demographic Challenge (MITERD)
- Ministry of Agriculture, Fish and Food
- Follow-up reports for RBMPs
- AdapteCCa Climate Change in Spanish Adaptation Platform

## USEFUL DATASET SITES

- WWF guide to verifying legal water use in agriculture.
- MITERD Geographic Viewer (Geoportal): Geospatial information on hydrology, environment, climate, etc.
- RBMPs dashboard: Official website for RBMP basin district status, surface and groundwater body status, and pressures.
- Hydrological Bulletin dashboard: Interactive viewer providing water availability status and evolution of reservoirs and river flows for all basins.
- Special Plan of the Forest Crown of Doñana: Online viewer for the Special Plan for the Doñana Forest Crown area – shows agricultural or irrigated areas within the natural space.
- Geographic Information System for Agricultural Parcels (SIGPAC): Geographic Information System for identifying declared agricultural parcels.
- National Geographic Institute: IGN downloads: Cartographic information database on themes including land use/land cover, flooding areas and riparian zones.
- National Surface/Groundwater Monitoring Network: Geographic viewer providing data on groundwater levels, river flows and quality status in real time.
- SIAR: Online system that captures, records and discloses the agroclimatic data necessary for calculating the water demand of irrigation areas.
- Water Framework Directive – WISE Quality Elements: Online tool mapping the ecological status or potential of surface water bodies based on their quality elements status value.
- Nitrate vulnerable areas: Cartographic information and access to regulations on nitrate vulnerable areas for Spain.
- Water bodies affected by nitrate loads: MITERD data on nitrate loads from agricultural sources affecting surface and groundwater bodies.
- MITERD Natural Datasets Viewer: Information system for natural data, including a geographic viewer to identify Natura 200 or protected areas.
- European Protected Sites EEA Map Application: Geographic viewer with an overview of protected sites in Europe.
- AdapteCCa Climate Change Scenarios Viewer: Official viewer for climate change scenarios on temperatures, precipitation and other parameters for Spain.

# END NOTES


1. AWS Standard and Guidance: https://a4ws.org/the-aws-standard-2-0/
2. Water Stewardship In Agriculture: The Case Of Iberesparragal: https://a4ws.org/download/water-stewardship-in-andalusia-spain-the-case-of-iberesparragal/
3. https://www.fruitlogistica.com/fruit-logistica/downloads-alle-sprachen/auf-einen-blick/european_statistics_handbook_2021.pdf
4. https://www.mapa.gob.es/es/prensa/ultimas-noticias/las-exportaciones-agroalimentarias-y-pesqueras-se-incrementaron-un-41-en-2020-y-alcanzaron-su-cifra-r%C3%A9cord-53.848-millones-de-euros/tcm:30-573229#prettyPhoto[pp_gal]/0/
5. https://www.ine.es/dyngs/INEbase/es/operacion.htm?c=Estadistica_C&cid=1254736176839&menu=ultiDatos&idp=1254735976602
https://www.mapa.gob.es/es/estadistica/temas/estadisticas-agrarias/regadios2021_tcm30-621075.pdf
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9. A. Dumont, B. Mayor, E. López-Gunn (2013) Is the Rebound Effect or Jevons Paradox a Useful Concept for Better Management of Water Resources? Insights from the Irrigation Modernisation Process in Spain. Aquatic Procedia 1, pps.64-76 Available at: https://www.sciencedirect.com/science/article/pii/S2214241X13000072
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12. https://fenacore.org/wp-content/uploads/2022/04/FENACORE-relacion-de-comunidades-federadas.docx.pdf
13. https://www.boe.es/eli/es/rd/2007/07/06/907/con
14. MITERD geographical viewer: https://sig.mapama.gob.es/geoportal/
15. Ibid
16. https://www.chsegura.es/es/cuenca/caracterizacion/usos-demandas-y-presiones/usos-y-demandas/
17. Agroclimatic Information System for irrigation (SIAR): https://eportal.mapa.gob.es/websiar/Inicio.aspx
18. MITERD: https://www.miteco.gob.es/es/
19. Ministry of Agriculture: https://www.mapa.gob.es/es/agricultura/temas/default.aspx
20. The management of water in Spain is based on a single hydrological cycle and all continental waters, regardless of their origin, have the same legal consideration. Water is a public resource and falls within the Public Water Domain (Dominio Público Hidráulico). Since it is a public resource, access to water is regulated by law that determines which uses are freely accessible and which uses must be obtained through the granting of some type of authorisation or license. The Public Water Domain constitutes continental waters (both surface and groundwater), continuous or discontinuous natural streams, and reservoir beds and lakes. The existence of the Public Water Domain ensures the protection of water resources and their ecosystems, and any activity or use that could affect it is forbidden.
21. https://portalrediam.cica.es/VisorRediam/?conf=/configvisor/visor_corona_forestal/plan_regadios.json
22. https://www.wwf.es/?56520/Guia-uso-legal-del-agua-en-agricultura
23. World Resources Institute – Water Risk Atlas _Aqueduct Water Risk Atlas (wri.org)
24. WWF Water Risk Filter: https://waterriskfilter.org
25. Water Extraction Index (WEI+): https://www.eea.europa.eu/data-and-maps/explore-interactive-maps/water-exploitation-index-for-river-2
26. http://www.goodstuffinternational.com/images/PDF/GSI_Tech_paper_1_Water_balance_as_fundamental_methodology.pdf
27. Automatic Hydrological Information Systems (SAIH): https://www.miteco.gob.es/es/agua/temas/evaluacion-de-los-recursos-hidricos/SAIH/
28. Agroclimatic Information System for Irrigation (SIAR) system: https://eportal.mapa.gob.es/websiar/SeleccionParametrosMap.aspx?dst=1
29. Monitoring network of MITERD: Monitoring programmes for water status and quality (miteco.gob.es)
30. MITERD Hydrological Water Bulletin: https://miteco.maps.arcgis.com/apps/dashboards/912dfee767264e3884f7aea8eb1e0673
31. River Basin Management Plans: https://servicio.mapama.gob.es/pphh/public/pphh?locale=en
32. Water Information System for Europe (WISE): WISE EIONET spatial data sets — European Environment Agency (europa.eu)
33. Water Framework Directive: https://www.eea.europa.eu/data-and-maps/explore-interactive-maps/water-framework-directive-quality-elements
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35. https://www.miteco.gob.es/es/agua/temas/estado-y-calidad-de-las-aguas/proteccion-nitratos-pesticidas/estado-nitratos/
36. MITERD Natural Protected Areas datasets and geographic viewer: https://sig.mapama.gob.es/bdn/
37. European Protected Sites dataset: https://www.eea.europa.eu/data-and-maps/explore-interactive-maps/european-protected-areas-1
38. Natura 2000 Network Viewer: https://natura2000.eea.europa.eu/
39. World Database on Protected Areas: https://bit.ly/3EWvv9u
40. MITERD: https://www.miteco.gob.es/es/agua/temas/observatorio-nacional-de-la-sequia/informes-mapas-seguimiento/
41. Hydrological Bulletin Dashboard: https://miteco.maps.arcgis.com/apps/dashboards/912dfee767264e3884f7aea8eb1e0673
42. https://www.wwf.es/?57520/Informe-sobre-los-efectos-del-cambio-climatico-en-la-Peninsula-Iberica
43. https://www.adaptecca.es/sites/default/files/documentos/impactosyriesgosccespanawebfinal_tcm30-518210_0.pdf
44. http://www.cedex.es/NR/rdonlyres/3B08CCC1-C252-4AC0-BAF7-1BC27266534B/145732/2017_07_424150001_Evaluaci%C3%B3n_cambio_clim%C3%A1tico_recu.pdf
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46. National Climate Change Adaptation Platform: https://adaptecca.es
47. National Climate Change Adaptation Platform Viewer: https://escenarios.adaptecca.es/#&model=EURO-CORDEX-EQM.
.average&variable=tasmax&scenario=rcp85&temporalFilter=year&layers=AREAS&period=MEDIUM_FUTURE&anomaly=RAW_VALUE
48. https://www.miteco.gob.es/es/cartografia-y-sig/ide/descargas/agua/zonas-vulnerables.aspx
49. https://www.miteco.gob.es/es/cartografia-y-sig/ide/descargas/agua/aguas_afectadas.aspx
50. https://www.miteco.gob.es/es/agua/temas/estado-y-calidad-de-las-aguas/proteccion-nitratos-pesticidas/estado-nitratos/
51. https://www.librogobernanzagua.es/
52. World Resources Institute – Water Risk Atlas _Aqueduct Water Risk Atlas (wri.org)
53. WWF Water Risk Filter for Europe: https://waterriskfilter.org/explore/map/europe
54. WWF Water Risk Filter for Spain: https://waterriskfilter.org/explore/map/spain
55. Water Framework Directive (europa.eu)
56. https://www.wwf.es/?56520/Guia-uso-legal-del-agua-en-agricultura
57. AWS Standard System Training: https://a4ws.org/training/
58. AWS Tools Hub: https://tools.a4ws.org/my-account/subscriptions/