INSTITUTO NACIONAL DE ESTADISTICA

Survey on water use in the agrarian sector

Methodology

Index

1	Introduction	3
2	Objectives	4
3	Description of the production units	5
4	Design of the survey	6
5	Variables and definitions	8
6	Collection of the information	14
7	Processing of the information	15
8	Data expansion stage	16
9	Main results	17

1 Introduction

Agrarian uses of water include agricultural ones, relative to vegetal production and livestock, relative to animal production. Water demand in the livestock sector is negligible when considering irrigation. The most important argicultural use is irrigation and this constitutes the main objective of this work.

Water demand for irrigation is characterised by its large volume and its gathering in the driest months of the year, which obliges regulating and mobilising seasonally significant quantities of water annually.

The role played by irrigator communities in the use and management of water is highly important as they asume the distribution of the irrigating water to the agricultural holdings associated to them. Those communities take a risk of aproximately two thirds of the potential irrigation surface of the national territory.

The survey on water use in the agrarian sector belongs to the statistical operation no. 6090 "Water use statistics" included in the National Statistical Plan 2013 – 2016.

2 Objectives

The main objective of the survey is, for one stage, to quantify the water volume used for agrarian sector irrigation by irrigating communities. In a second stage, this objective involves also the elevation of these data to all the irrigation surface in Spain, so as to estimate the volume of irrigating water used in the whole national territory.

The study of the economic variables that make up irrigating communities production activity is complementary, but highly relevant.

As a result of crossing economic and physical information, we are able to face also estimations on the average price of irrigating water managed by irrigating communities.

Finally, the survey satisfies two additional information requirements:

– To satisfy the need for information demanded by various users of this type of statistics, and especially to supply EUROSTAT and OECD with the information on water use which these international bodies require from member states whithin the framework of the JQ-Inland Waters joint questionnaire.

– To supply necessary information prepare the satellite water accounts.

3 Description of the production units

Irrigator communities are regulated by the current Water Law, which oblies every user of a same water resource to constitute a user community. When the destination of water is irrigation, these communities will take the name of *irrigator communities*.

Actually they take several names (irrigator communities, irrigator inheritances, well communities, etc.) depending on their origin and the type of resource they use. So, in this survey "irrigating communities" refers to those entities constitued for managing as a group the water resources for agrarian activities of one area.

Now then, as the phrase "*irrigating community*" has become the term for naming this type of entities, and bearing in mind that is their legal denomination, in this document we will use it.

Irrigator communities are companies under public laws attached for administrative purposes to the pertinent basin organisation They have independent mangament warranted by bylaws and regulations that must be writen up by the irrigators ("community members") and approved afterwards by the pertinent Public Administration (hydrographic confederation). The purpose of irrigating communities is the group exploitation of the water in their hydraulic public area. Their main object is the assignation and distribution of the irrigating water provided to them by a state license. They might also own water resources (non-continuous origin surface water, groundwater, rainwater, treated water or desalinated sea water).

4 Design of the survey

POPULATION SCOPE

The population that is the object of the survey is the set of statistical units whose main economic activity is defined in the division 36 (operation of irrigating systems) of the National Classification of Economic Activities (CNAE-2009), and in the subgroup 01.410 of the CNAE-93. That is to say that the survey researchs on the statistical unit whose main activity is the operation of irrigating systems related to agriculture and livestock

The population scope of the survey of activities related to the urban public supply of water and the private supply carried out by agrarian exploitations (self-supply or private water collection) are excluded.

TERRITORIAL OR GEOGRAPHICAL SCOPE

From the geographical point of view, the survey covers the set of statistical units that exercise their productive activity in the whole country.

For the purposes of the statistical operation, the survey is designed to facilitate results at Autonomous Community level. Pilot studies regarding the disaggregation of water volume physical data by hydrographic areas/condeferations are being developed.

TEMPORAL SCOPE

The survey is continuous and is carried out annually. As for the information reference period, the data requested refer to the natural year perior to the data collection, and water volume data to the agricultural/hydrological one.

FRAMEWORK AND SAMPLE DESIGN

The population object of the survey is te economic activity unit classified in division 36 of the National Classification of Economic Activities (CNAE-2009), which includes the former subgroup 01.410 of the CNAE-93 *"operation of irrigation systems related to agriculture or livestock".*

The Irrigators Association General Catalogue for 1994 published by the former Ministry of Public Work, Transport and Environment, updated with information coming from the INE Central Companies Director (CCD) and other complementary information coming from administrative records of the Ministry of Environment, Rural and Marine Affairs and the Autonomous Communities, has been used as an inital reference framework.

SAMPLE SCOPE

The use as framework of this initial directory facilitates carrying out the exhaustive collection of information from those irrigator associations that group together agrarian exploitations with a total area greater than 2,000 hectares. The irrigation communities with an area less than this magnitude are studied by sample, selecting a quota of entities previously stratified by size, using a commitment allocation that is either uniform or proportional, so that for each Autonomous Community, the irrigation area studied is approximately 60% of the total. In Spain, the theoretical sample is made up of about 750 irrigating communities.

5 Variables and definitions

For a better understanding and interpretation of the results presented in the tables, the variables collected in the questionnaire are defined below. Primary economic data from the survey have been listed according to a simplified classification of the income and expense breakdown. As irrigating communities do not have to adapt their economic activities to accounting regulation, the General Accounting Plan nomenclature has not been used.

INCOME AND EXPENSES OF THE IRRIGATING COMMUNITY

INCOME

1. Income coming from water supply calls for funds and quotas to agricultural exploitations of the Irrigating Community

This concept groups the total amount of income obtained by the irrigating community as a counterpart to irrigating water supply to the partners of the entity (community members). It is the part of quotas and calls for funds allocated to the irrigating community explotation expenses covering. It does not include the tax payments to basin entities.

2. Income for tax payment to basin entities

It includes the payments made by the partners of the irrigating community to the entity itself in order to pay the costs of the adjustemet tax and/or water use tax assumed by basin organisations. It is an invoicing delegation by the basin entity (hydrographic confederation) to the irrigating community.

This rubric includes both the *regulating tax* for water channel regulating works carried out by the basin entity that benefit the activities of the irrigating community and the water *use tax* for non-regulating works or as a concept for water availability and use.

3. Icome coming from water supply with non-agricultural destination

In this concept it is grouped the income related to the supply of the water that is not use for crops irrigation, but for other uses as leisure, urban or industrial uses.

4. Income that not related to water management

It comprises the income of the Irrigator Entity that is not related to water management, as it can be financial income, service supply, etc…

Sales of tangible fixed assets are not included in this rubric, but in the "*Tangible fixed asset operations"* one.

5. Investment aid and subsidies

This rubric covers monetary transfers granted to the irrigator entity by public administrations, companies or individuals as investment aid for the creation of

new irrigation networks, modernisation and renovation of infrastructures and irrigation systems, installation of measurement devices, etc.

Likewise, it includes regular subsidies intended for covering completely or partially the cost of the measures for reducing polluting substances emission, as well as interest rate subsidy granted by the public administration as credits requested by the irrigator entity.

EXPENSES OF THE HOLDING

1. Personnel costs

Includes all quantities, obligatory or voluntary, paid in cash or in kind by the company to all types of their salaried personnel of (permanent or temporary) as remuneration for the work carried out by them. These payments are accounted for as gross, in other words, before deductions corresponding to social security and income tax of workers are made.

2. Fixed assets depreciation

It represents the adjustement of book value, made every year, on the entitie's fixed assets, as a consequence of the systematic depreciation due to its use. It consists on the distribution of the historic or adjusted cost of the fixed assets during the estimated life span of each item. The amount must be carried out every year, as long as it exists depreciation, regardless the fact that the results of that year are positive or negative.

3. Rates and taxes

This concept groups all the amounts payed by the irrigator entities to basin organisations (hydrographic confederations), which have been collected through delegation to their community members by the above mentioned. In essence, they are the adjustement tax, which is a tax on people who take profit of the regulation works of irrigating water channels carried out fully or partially paid by the State, and the water use rate, which is a tax on water disponibility thanks to specific hydraulic works different to those related to adjustement.

This rubric includes taxes passed on by the basin organisations to irrigator communities as the expense of water transfer between river basins.

4. Inter-basin water transfer expenses

When the irrigating community has a volume of water coming from inter-basin transfers, this rubric will include the amount that the community pays to the basin entity for the water received.

5. Water purchase to other entities expenses

This rubric refers to the expenses of the irrigating community when purchasing water to other entities (central watering union, general irrigating community, etc...).

6. Electricity supply expenses

It includes every amount related to the irrigator entitiy's expenses on electricity supply. These expenses come both from electricity expenses in offices and in pumping systems.

7. Remaning current expenses

It includes current expenses on conservation, repairing and maintenance works of the goods included in intangible assets (lands and natural goods, buildings, piping facilities, machinery, computer equipment, transport equipment, etc.). It also includes expenses on rents, offices, external professional services, as well as any other current expenses not included in other rubrics.

8. Paid VAT and other taxes on products

This rubric includes, apart from the VAT, taxes on property transfers and recorded legal actions, tax on insurance premiums, installations and works, as well as other taxes on products (excluded from VAT) and taxes on imports and exports.

9. Taxes on production

This rubric comprises taxes on land property (rustic contribution), on buildings (property tax), taxes on motor vehicles, on economic actitivies, compensation of local taxes and professional, company or planning permissions. Environmental taxes are also included here.

10. Other taxes

This rubric referes to taxes paid by the irrigating community as capital gains or taxes due to sales of lands or other fixed assets, as well as any other taxes not included in the previous rubrics.

11. Financial expenses

This rubric groups all amounts for irrigator entity's loan repayments and for the payment of interest rates related to the aforementioned loans, as well as expenditure on non-social insurance premiums (robbery, fire, vehicles, etc.).

EMPLOYMENT

Occupied persons

Employees are understood as the set of fixed and temporary persons who during the data reference year to be carrying out remunerated or non-remunerated labour for the company. Persons with leave for illness, remunerated holidays, occasions without pay, etc., as well as part time workers (as long as they work more than 1/3 of the complete working day) are included.

Salaried personnel is considered to be any employee that work or carry out any activity for the irrigating community in exchange for a monetary remuneration.

Workers who do not receive a fixed remuneration or work less than a third part of the working day are not included among salaried personnel.

Annual hours worked

Hours worked are understood as the number of hours effectively worked by the employed personnel during the survey reference year.

TANGIBLE FIXED ASSETS OPERATIONS

This rubric refers to gross investment carried out during the reference period on fixed and non-fixed assets. Already existing tangible capital goods that have been purchased or produced for self-consumption are included when they have a life span of over one year. Among them, there are the following categories:

1. Lands and tangible goods

It includes lands, woods and inland water. When the lands are purchased with buildings and the value of the components cannot be separate, the total value has to be written down in this rubric if the value of the lands is greater than that of the buildings. If the buildings have more value than the lands, the total shall be registered in "D.1.4 *Other tangible fixed assets*". If the value of the components can be separate, then the value of the lands has to be included in rubric D.1.1 and the value of the buildings in rubric D.1.4.

2. Improvements in the distribution network

This rubric refers to investment carried out for distribution networks in order to increase their length and/or improve their efficiency (reduction of water losses, etc.). Maintenance operations of those networks whose cost is included in rubric B.2.7 "*Rest of current expenses*" are not included accounted for in this rubric.

3. Pressure equipment

They are investment carried out for pumping equipment.

4. Other non-tangible fixed assets

It comprises investment not included in the previous rubrics, such as construction, transport items (vehicles), computer equipment, tools, furniture, etc…

Purchase & improvement

Purchased goods are valuated at their purchase price, including transport and installation consts, professional fees, taxes and other expenses related to property transfer. Goods owned by mergers or restructuring are excluded. Self-Self-produced tangible goods are valuated at production price.

Sales

Tangible goods sales include the value of tangible capital goods sold to third parties. These sales are valuated at VAT-excluded price and not at their book

value after deducting property transfer costs payed by the seller. Value adjustments and transfers that were not made by means of sale are excluded.

NON-MONETARY ACCOUNTING DATA

Availability of water or water use right transfer

The administrative concession is the volume of water which use by the irrigating community is authorised, based on the rights to the exclusive use of water obtained by said community due to an administrative concession of the Basin Entity (Hydrographic Confederation) or law.

The right transfer is the fact that an irrigating community transfers to surveyed irrigating community the right to use a certain water volume that it had as an administrative concession.

The water is surface or groundwater both for administrative concessions and for water use right transfer.

Volume of effectively available water

In this rubric effectively water volumes available for irrigation during the survey reference year are included. Effetively available water volume is the one that the irrigating community can have in order to supply its distribution networks, that is to say once the losses in the transport network (conduction) are deducted.

This rubric also includes those water volumes (surface or groundwater) that are not subject for an administrative concession.

Water volumes that are subject for and administrative authorisation for the use of treated wastewater (regenerated water) are included in this rubric, as well as desalinated sea water.

Estimated losses in the water transport networks (conduction)

They are estimated losses that take place among the water transport networks from the water source (reservoirs and marshes for surface water / dwells or boreholes for groundwater) to the tanks or regulating reservoirs of the irrigating community.

Continental surface water

The continental surface water is that water which runs on the surface or which stay on the surface of lowland, in other words, retained. Therefore, water of natural riverbeds (rivers, streams, lakes) and artificial streams (channelling system for irrigation, industry and navigation, drainage and artificial reserves) are included. Salty water coming from transition water (salty lakes, estuaries, etc.) are included in this rubric.

For the purposes of this survey, filtration produced on the banks are included as surface water while transition waters, salty marshes and estuaries are not

considered as surface water and are included under other types of water resources.

Underground water

This type of water resource refers to water that has been extracted, generally from or through an underground formation, that is, from an aquifer source. These sources are all permanent or temporary water deposits, which are filled in both an artificial manner and natural manner. This category includes the water contained in the water table and geological depressions. Salty water coming from dwells, drillings or boreholes is included in this rubric.

This rubric includes also the water collected from springs. Underground water coming from filtration is excluded, as it will be included in the surface water rubric.

Water supplied and purchased water to other communities

It refers to the volume of water that the irrigator entities have purchased from other ones.

Water purchased and supplied to other economic units

It includes the volume of water supplied for uses that are not related to the irrigation of agricultural holdings owned by the partners of the entity. The destination of the water supplied may be other agricultural and livestock uses, such as farms, other irrigator entities, etc., industrial uses and water intended for urban supply.

Distribution of water to agricultural holdings

This operation includes the total amount of water used by all agricultural holdings for irrigating areas under cultivation both by type of crops and by irrigation technique.

As it is highlighted in the eight section of this document (*Data expansion* stage), the estimation of the total water volume used by type of crop is compared to the total water used by irrigation technique, the first one might be overestimated. For this calculation the efficiency of the application of those techniques is not considered.

Therefore, conceptually, the survey estimations of water volumes used by type of crop cannot be assimilated to their net water demand, due to the fact that, as has been already said, losses related to irrigation techniques efficiency are not considered.

6 Collection of the information

The collection of information has been carried out by means of a centralised collection to speeding up the collection of questionnaires. The procedure has been the sending by post of a letter with a password for accessing the online platform where the informat can fill in online the questionnaire. If the informant wants to, they can ask the INE to send them by post a questionnaire that they will have to send back by post or fax.

Questionnaires were remitted to the Irrigators Association, which constitute the sample during the third quarter of the year. Together with the questionnaires information units received a notebook of instructions in each consignment to specify concepts or clear up questions about the questionnaire.

The statistical assistants complement the collection tasks calling the Irrigators who have not returned the questionnaires within the foreseen deadline, with the object of requesting information from them, advising them where necessary and obtaining the completed questionnaire. The assistants also carry out roles supporting collection such as updating the directory, control and revision of questionnaires.

The management of the sample company files, both for controlling collection and for updating data from informant companies is carried out by means of an IT application established for this purpose. This facilitates guaranteeing the control and organisation of the whole process. This system guarantees an efficient control of the process from the start of the survey as the systematic errors of filling in the questionnaires can be detected in the initial phases of the survey, thus facilitating their correction.

7 Processing of the information

The initial stage of the survey information processing coincides with the fieldwork and is carried out in parallel with the duration of the data collection.

The main purpose is to establish appropriate quality levels that make it possible to record right and appropriately the questionnaries, as wells as to significantly simplify the subsequent processing of the information. The recording of questionnaires is carried out in batches, establishing the control measures required to guarantee an adequate level of quality throughout the whole process. The aim is to avoid errors in this stage that might affect the information obtained from the information units.

Once questionnaires are recorded and information is available in magnetic form, the coverage of the information is analysed in order to guarantee the totality of the data recorded, detect possible duplicated data or coverage errors and also to be able to perform an initial assessment of the quality of the variables obtained from the questionnaires. This stage is performed for each batch of questionnaires recorded, and its implementation is previous to the creation of the survey file and thus, to the processing of all the information as a whole.

Once the survey file is created, inconsistencies and errors are detected and corrected for every identification variable. Subsequently, several stages of filtering and imputation of content errors are carried out. Similarly, the systematic errors detected in the analysis and study carried out previously on the recorded data are corrected.

When all filtering stages are completed, analysis tables are obtained in order to detect and eliminate errors or inconsistencies and to compare the results obtained with other sources of information, particularly those related to the consumption by surface unit, by irrigation technique and type of crop.

8 Data expansion stage

As it was already highlighted in the introduction of this document, irrigating communities assume almost two thirds of the potentially irrigatable surface in Spain.

In order to refer the final results to the total irrigation land in each Autonomous Community, the expansion of the consumption per hectare for the sample is performed, using exogenous variables on the total irrigation surface in Spain by technique, provided by the Survey on Crop Areas and Yields in Spain (ESYRCE) of the Ministry of Environment, Rural and Marine Affairs.

For the expansion in each Autonomous Community of the sample volume of water distributed by type of crop, we apply their sample structure to the total expanded water volume by irrigation technique according to the statistical procedure referred to in the previous paragraph.

Regarding water availability, the expansion method is based on a ratio estimator that uses – for each Autonomous Community – the total irrigation surface (source ESYRCE) and the surface supplied by irrigating communities as auxiliary variables. The last one is estimated in the model of agricultural holdings water consumption (*Survey on Production Methods in Agricultural Operations – Agrarian Census 2009* carried out by the INE).

The differences in the water structure (surface/ground), whether it is managed by irrigation communities or by self-water-supply agricultural holdings, are taken into account for the expansion of the water availability module, using the auxiliary information provided by the aforementioned model.

Finally, for agricultural holdings assigned to irrigating communities, the aforementioned model also provides information for the estimation of private water resources of those holdings, which are mainly groundwater.

9 Main results

The tables of results which are presented in this publication try to offer basic and at the same time relevant information, on the main results of the survey which facilitate meeting the demand for information from the different users.

Physical variables allow the obtaining, for all the irrigation surface in Spain, of water supplied to agricultural holdings by irrigation technique, water supplied to agricultural holdings by type of crop, water supplied to other economic units, water purchased from other entities and water availability aggregates.

Economical variables provide information about loss and income, personnel data and works carried out for fixed assets of the irrigating communities.

The results are presented both at national level and by Autonomous Community, excluding Asturias, Cantabria, Baleares, Galicia, País Vasco and Ceuta and Melilla Autonomous Cities, where the irrigation surface is less than 1% of the total surface under cultivation.