

IRRIGATION



QUELLES STRATÉGIES POUR ÉCONOMISER L'EAU ? WHAT STRATEGIES FOR WATER SAVINGS ?

REGARDS CROISÉS EUROPÉENS
SHARING EUROPEAN VIEWS



13 - 14

nov. 2019

MONTPELLIER

FRANCE



PROJET COFINANCÉ PAR LE FONDS EUROPÉEN AGRICOLE POUR LE DÉVELOPPEMENT RURAL
L'EUROPE INVESTIT DANS LES ZONES RURALES



MONTPELLIER UNIVERSITY OF EXCELLENCE WATERS



The Italian experience on water saving

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Water saving is an international challenge under climate change conditions

- In the EU 2014-2020 Rural Development Programming, the protection of water resources, together with the sustainable use of water, is one of the major challenges to be faced for the development of rural areas.
- The efficient and sustainable use of water is particularly important in the agricultural sector, as it allows to better face water scarcity and to reduce the negative economic impacts for the society.



Italian irrigation context

Structural features[*]:

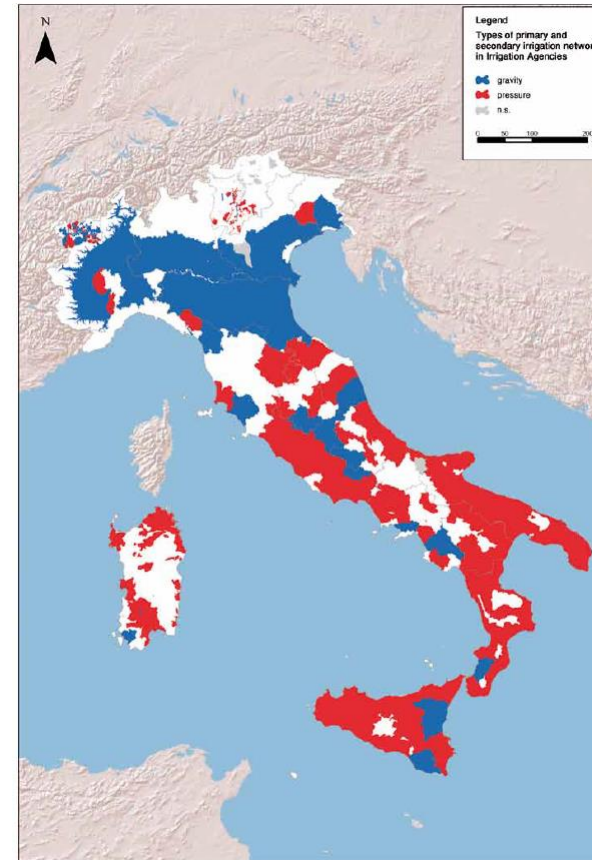
- **Collective irrigation** (supplied by Irrigation and Reclamation Consortia): 63% of water volume used, 56% of irrigated land
- **Self-supply irrigation**: 37% of water volume used, 44% of irrigated land

Geographical features[**]:

- **North.** Large water river basin, great availability of water and historically widespread collective irrigation.
- **Centre.** Water bodies of medium and variable size, collective irrigation limited to specialized areas of medium and small size and prevalent self-regulated irrigation system in in-land hilly areas.
- **South.** Irregular stream-like water bodies, imbalance between availability and irrigation needs, recently establishment of reservoirs and of jointly managed irrigation schemes, with predominant self-regulated irrigation.

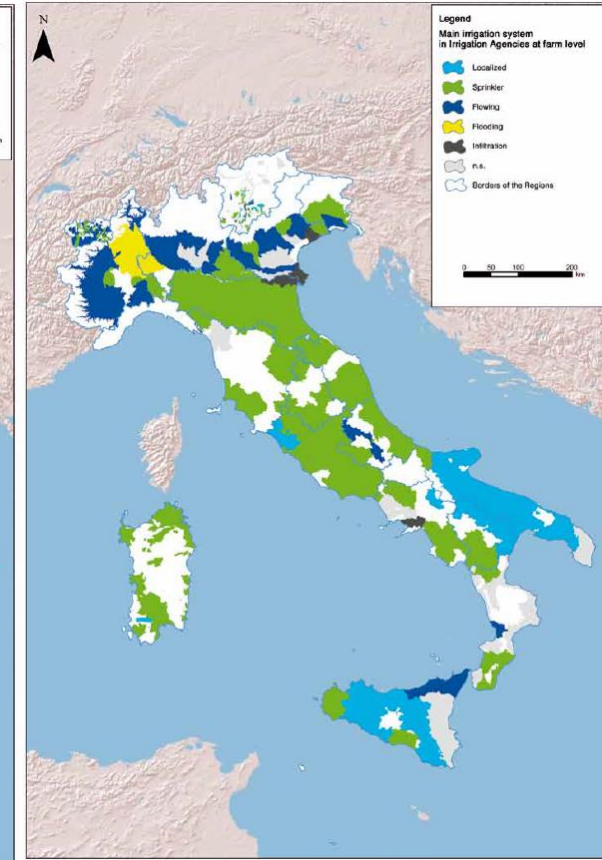
*ISTAT (2014), "Utilizzo della risorsa idrica a fini irrigui in agricoltura"

**Zucaro R. (2014), "Atlas of Italian Irrigation systems"



Primary collective irrigation network accounts for almost 23,000 km in length.

- Gravity 40%
- Pressured 60%



At farm level, different typologies of irrigation are present:

- Flowing;
- **Sprinkler**;
- Flooding Lateral;
- Infiltration;
- Sub-irrigation;
- Localized.

NRDP for irrigation investments



Strategic role of collective irrigation management in guaranteeing a sustainable and efficient use of water for irrigation



National Rural Development Programme

Sub-measure 4.3 to finance off-farm and collective irrigation investments by irrigation entities

291.000.000 euro

- **OBJECTIVES**

- ✓ To improve water storage capacity
- ✓ To reduce distribution losses
- ✓ To improve water management
- ✓ To diversify supply sources

**Technical Assistance of CREA
(measure 20 of NRDP)**

- **ACTIONS**

- Improving the efficiency (a) and building new reservoirs (b) (more than 250.000 cm)
- Completion (c), improvement (d) and adaptation (e) of the irrigation network
- Interventions on drainage and irrigation canals (f)
- Water energy efficiency (g)
- Monitoring and remote control systems (h)
- Interventions for the reuse in agriculture of treated wastewater (h)



National vs Regional interventions

DIFFERENT ACTIONS and BENEFICIARIES

Demarcation of the interventions with respect to the RDP, as was clearly explained in the Partnership Agreement
(*Principles of no double funding*)

21 Regional Rural Development Programmes

- ✓ On-farm irrigation investments (sub-measure 4.1) (single farms)
- ✓ Off-farm and collective irrigation investments (sub-measure 4.3) (by associated farms, reclamation consortia, other subjects)
- ✓ Reservoir having capacity less than 250,000 cubic meters, and related network, can be financed through RDPs (local interest)



1 National Rural Development Programme

- ✓ Off-farm and collective irrigation investments (sub-measure 4.3) (by reclamation consortia, other public bodies responsible for management of water for agriculture, no associated farms)
- ✓ Reservoir having capacity greater than 250,000 cubic meters and related network



Water saving for eligibility and selection

ELIGIBILITY CONDITION

- Minimum potential water saving required, depending on eligible actions (between 6% and 15%)
- Effective reduction in water use, almost half of the potential water saving (if status less than good for quantitative reasons) with reference to a withdrawal baseline calculated as the average of the previous seven years, measured or estimated (according to Annex 9) and to be checked *ex post*

Evaluate by a preliminary Committee appointed by the managing authority and validate by

SELECTION CRITERIA

(13 in all to achieve maximum 100 points)

- Potential water savings above the baseline for eligibility (2 pts for each 1% above baseline, until 35 pts)

Annex 9 of call for tender

Technical document concerning common estimation methodologies for abstraction and uses, by self-supply and collective irrigation, produced by MiPAAF in 2016 with the collaboration of an experts panel and approved by Regions.

External Committee of experts
Selected by tender procedure



Financed projects

Beneficiaries 19 irrigation agencies for about **272,8 Meuro**

- **15** irrigation entities for 224.6 Meuro in Centre- North Italy
- **4** irrigation entities for 48.2 Meuro in South Italy

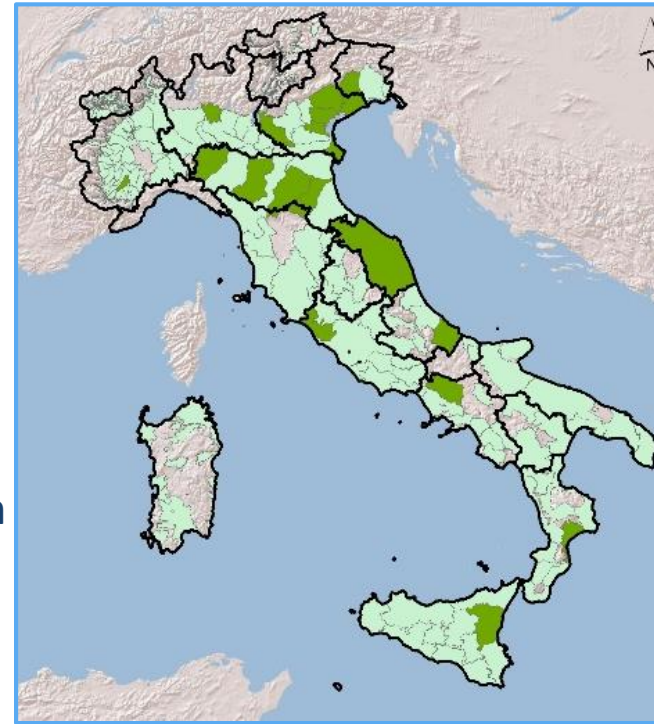
Main funded actions

- Improvement of existing distribution networks and installation of meters
- Adaptation of existing distribution networks

Ex ante efficacy estimation

- Potential water saving about 139 million cubic meters
(0,66% of national collective abstraction)
- Project efficacy about 1,96 euro/cubic meters

EX POST check **possible through the INSTALLED METERS**



River basin district	Potential water saving through investments/withdrawals for agriculture use (%)
EASTERN ALPS	1,75%
PO RIVER	0,22%
NORTHERN APPENNINES	19,09%
CENTRAL APPENNINES	1,48%
SOUTHERN APPENNINES	5,47%
SARDINIA	-
SICILY	6,42%
Total Italy	0,66%

Source:
-SIGRIAN, 2016
-Beneficiaries NRDP- Sub measure 4.3, 2019

OBLIGATIONS

- to have meters (or to install as an investment)
- to collect and transmit to competent authority and tools (SIGRIAN) irrigation volumes abstracted and used (through measurement or estimation) also in order to assess the water savings achieved over time.



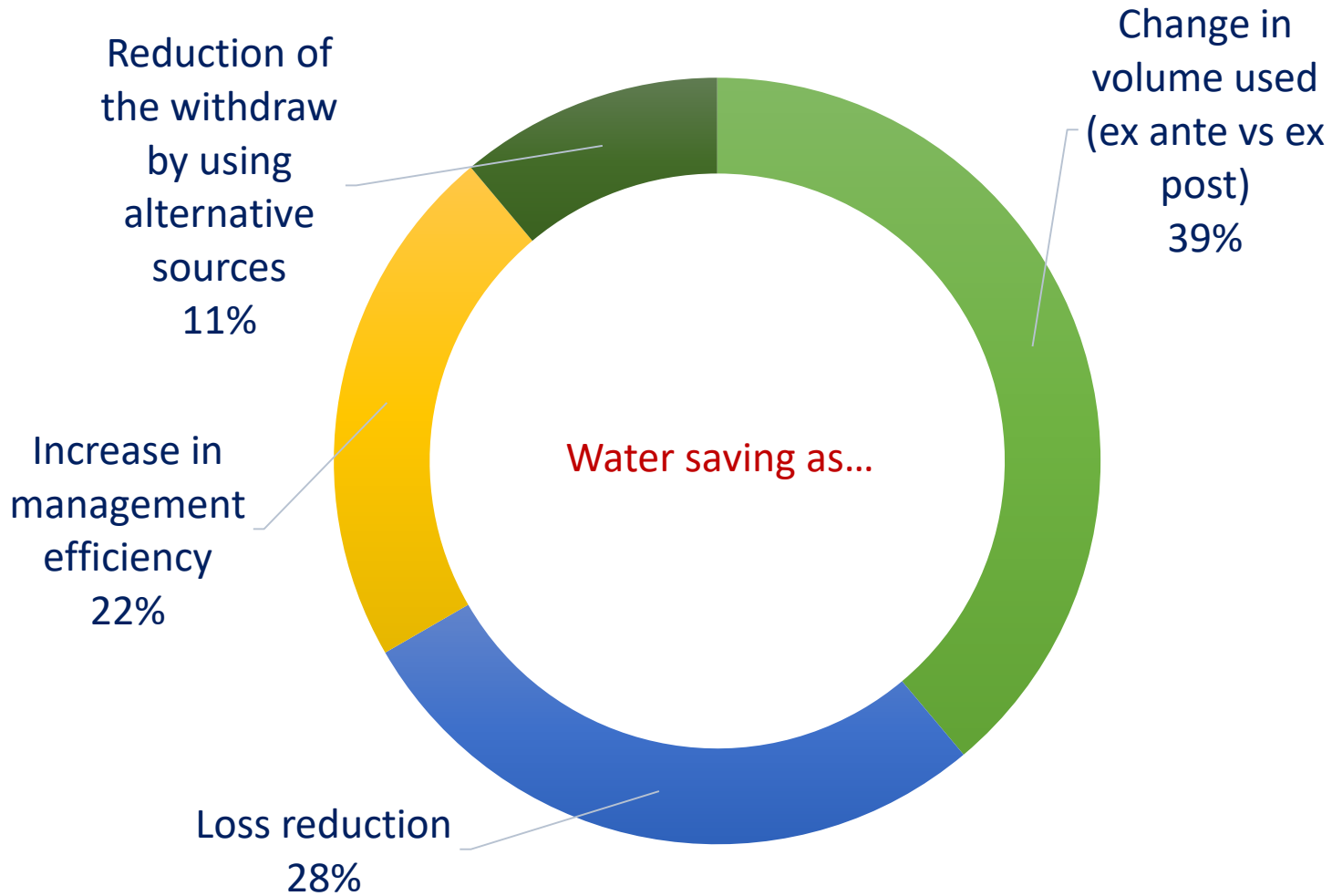
Critical issues about water saving assessment

MAIN CRITICALITY

- Great variability of irrigation context
 - Different type of eligible actions (reservoirs, networks, meters, etc...)
 - No specific indication in the selection announcement about methodologies to be used (except for estimation method set out in Annex 9)
 - Lack in homogeneity of calculation by beneficiaries
 - Unit of measure different from cm (l/s , l/s*ha, cm/ha)
 - Evaluation of water saving only in % term not ever starting from the past value
 - Use of non validate data
- External Committee of experts for selection of project (from academic and professional sector) selected by tender procedure
 - Coordination and validation at national level
 - support to regional Management Authority for the evaluation of the consistency of the proposed methodology with Article 46 of RDR 1305/2013, within the regional RDPs
 - Technical Committee set up at the CREA and composed of internal and external experts



Water saving assessment



Methods and tools

- estimation of irrigation requirements using water balance models or irrigation advisory systems (IRRIFRAME, others...)
- use of historical measured withdraw data as archived in SIGRIAN*
- change in requirements related to the variation of distribution efficiency (as tabled or from past experience)
- assessment of losses based on data measured in the past
- assessment of actual and future uses thank to different regulation maneuvers or better management of irrigation service (i. e. thanks to meters or to modernization of equipment)

*National Information System for Water Management in Agriculture, webgis managed by CREA



Water saving for on-farm irrigation investments: Veneto experience



- in % term in case of good status of water body (5 - 25%)
- depending on change in equipment efficiency (tabled)

- In absolute (and in %) term, in case of water body in status less than good, in order to checked **ex post** the **effective reduction in water use**

- Depending on total water requirement of the served surface (tabled) and on change in equipment efficiency (tabled)

Tabella 1.1 "Efficienza delle tecniche irrigue"¶

Codice impianto	Tecniche irrigue	Efficienza %	Classe di efficienza %
01	Scorrimento e somministrazione con alimentazione per gravità	10	B
02	Scorrimento e somministrazione con alimentazione per sollevamento meccanico	10	B
03	Infiltrazione laterale da solchi o da scoline	20	B
04	Manichetta forata ad alta portata	20	B
05	Tubazioni mobili o fisse con irrigatori ad alta pressione (> 3,5 bar)	40	M
06	Rotolone con irrigatore a lunga gittata o barra nebulizzatrice, senza centralina elettronica di controllo della velocità e della pluviometria	50	M
07	Pivot o Rainer con irrigatori, senza sistema di controllo dei volumi e della velocità di avanzamento	55	M
08	Tubazioni mobili o fisse con irrigatori a bassa pressione (< 3,5 bar)	60	M
09	Rotolone con irrigatore a lunga gittata dotato di manometro sulla macchina e sull'irrigatore, centralina elettronica di controllo della velocità e della pluviometria	60	M
10	Impianti microirrigui con erogatori con coefficiente di variazione di portata > al 5% per impianti a goccia e > al 10% per impianti a spruzzo o di età > a 10 anni	60	M
11	Pivot o Rainer attrezzati con calata per avvicinare l'erogatore alla coltura, senza sistema di controllo dei volumi e della velocità di avanzamento	65	M
12	Irrigazione a goccia	70	A
13	Spruzzatori sovrachiuma con erogatori aventi coefficiente di variazione della portata < al 10%	70	A
14	Spruzzatori sottochiuma con erogatori aventi coefficiente di variazione della portata < al 10%	80	A
15	Pivot o Rainer con irrigatori sopra o sottotrave, funzionanti con pressioni < 3 bar, e dotati di sistema di controllo dei volumi e della velocità di avanzamento	85	A
16	Rotolone con barra nebulizzatrice a bassa pressione (< 3,5 bar) dotato di manometro sulla macchina e sulla barra, centralina elettronica di controllo della velocità e della pluviometria	85	A

Tabella 1.2 "Risparmio idrico potenziale"¶

Codice impianto	Indice efficienza irrigua impianto %	Categorie di efficienza (05-21%)																				
		05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21				
01	10	75	80	82	83	83	83	85	86	86	88	88	88	88	89	89	89	89				
02	10	75	80	82	83	83	83	85	86	86	88	88	88	88	89	89	89	89				
03	10	75	80	82	83	83	83	85	86	86	88	88	88	88	89	89	89	89				
04	20	50	60	64	67	67	67	69	71	71	75	76	76	76	78	78	78	78				
05	40	20	27	33	33	33	38	43	43	50	53	53	53	56	56	56	56					
06	50	17	17	17	23	29	29	38	41	41	41	44	44	44	44	44	44					
07	55	15	15	15	21	27	27	35	39	39	39	39	39	39	39	39	39					
08	60	15	15	15	21	27	27	35	39	39	39	39	39	39	39	39	39					
09	60	25	29	29	29	33	33	33	33	33	33	33	33	33	33	33	33					
10	60	25	29	29	29	33	33	33	33	33	33	33	33	33	33	33	33					
11	65	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28					
12	70	13	18	18	18	22	22	22	22	22	22	22	22	22	22	22	22					
13	70	13	18	18	18	22	22	22	22	22	22	22	22	22	22	22	22					
14	80	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6					
15	85	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6					
16	85	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6					
17	85	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6					

Potential water saving = {100 - [(% ex ante efficiency / % ex post efficiency) x 100]} / 100

Tabella 11.5.1 - Fabbisogno idrico (F) e interventi irrigui¶

CULTURE	Fabbisogno idrico (F)		numero di adacquate
	BIC(*) 1¶ [< 0 -mm]	BIC 2¶ [> 0 -mm]	
Actinidia	5.100	F(BIC-1) -10%	17
Melo	4.700	F(BIC-1) -10%	16
Pero	3.900	F(BIC-1) -10%	13
Drupacee e altre arboree (esclusa la vite)	2.300	F(BIC-1) -15%	8
Prato stabile	4.400	F(BIC-1) -10%	8
Mais, Radicchio, Insalate	3.000	F(BIC-1) -8%	5
Cipolla, Cocomero, Pomodoro	2.800	F(BIC-1) -12%	5
Altri seminativi, altre orticole e altre colture non ricomprese (inclusa la vite)	2.000	F(BIC-1) -15%	4
Coltivazioni in serra	14.000		

(*) BIC: Bilancio Idro-Climatico; rappresenta la differenza tra le precipitazioni e l'evapotraspirazione potenziale, espressa in millimetri.

- Total water requirement of the surface served by the plant (mc) = \sum (Water requirement per hectare of irrigated crop * surface of irrigated crop)
- A - Water use of the existing plant (mc) = (Total water requirement of the surface served by the plant (mc)/existing irrigation system efficiency (%)) * 100
- B - Water use of the new plant (mc) = (Total water requirement of the surface served by the plant (mc)/new irrigation system efficiency (%)) * 100
- A - B = Potential water saving**

The use of tabled information make it possible the automatical calculation of water saving according to surface under intervention (cadaster data) and change in equipment (project data) during the application for funding through an information system properly built by Region at the scope. (www.regione.veneto.it)

The past to improve in the future

Financing similar interventions through Development and Cohesion Funds 2014-2020 , detailed indications and requirements for applicants have been considered in the call for tender:

- A defined methodology for the calculation of water saving for each kind of intervention is provided
- A unique unit of measure is accepted (cm)
- The use of certificated data sources is required
- An evaluation of water saving by qualified expert that signs a specific report is required

Water saving methodologies

ACTIONS	WATER SAVING (CM)	WATER SAVING (%)
completion, improvement and adaptation of the existing irrigation network; interventions on drainage and irrigation canals	Difference between the volume of current losses and the volume of remaining losses following the project intervention	Water saving in cm compared to annual amount of water flowing through the equipment affected by the investment
Improving the efficiency of reservoir	Lower withdrawal from water bodies, quantified as an increase in the useful volume of the basin	Water saving in cm compared to annual amount of water flowing through the equipment supplied by the reservoir
New reservoir	Lower withdrawal from water bodies, quantified as the useful volume of the realized basin	Water saving in cm compared to annual amount of water flowing through the equipment supplied by the reservoir
Monitoring and remote control systems	Lower volume flowing in the network due to the more efficient irrigation management following the intervention, estimated on the basis of the different management methods before and after the intervention (regulation maneuvers, etc.), even starting from validated data, relating to similar interventions already implemented on similar areas managed by the same entities.	
Interventions for the reuse in agriculture of treated wastewater	volume of treated wastewater used to replace other natural sources	Water saving in cm compared to annual amount of water flowing through the equipment affected by the investment

All volumes must be determined on an annual basis using the data for the previous seven years, based on validated measures or an appropriate estimation method.

For further information

- www.crea.gov.it
- <https://sigrian.crea.gov.it/>
- https://sigrian.crea.gov.it/wp-content/uploads/2018/11/PSRN_Allegato_9_Finale.pdf
- <https://www.politicheagricole.it/flex/cm/pages/ServeBLOB.php/L/IT/IDPagina/11903>
- Zucaro R. (2014), “Atlas of Italian Irrigation systems”
(http://dspace.crea.gov.it/bitstream/inea/936/1/Atlas_Italian_irrigation_Zucaro.pdf)
- ISTAT (2010), “6° Censimento Generale dell’Agricoltura”
- ISTAT (2014), “Utilizzo della risorsa idrica a fini irrigui in agricoltura”
- www.regione.veneto.it



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Thank you for attention

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