



# SUWANU EUROPE

## SWOT and PEST analyses for implementation of reuse practices in Po Valley, Italy

### Contents

Socio-economic characterization of the region .....	2
SWOT Analysis.....	2
PEST Analysis combined with SWOT.....	8
Discussion and conclusion.....	13

## Socio-economic characterization of the region

The PO VALLEY is the largest and most important economic region in Italy. It is the centre of most Italian industry as well as Italy's agricultural heartland. Po River flows across seven regions, namely Piemonte, Valle d'Aosta, Liguria, Lombardia, Emilia Romagna, Veneto, Trentino Alto Adige. Together with its 141 tributaries, the Po catchment area stretches across 70,000 square km.

The SWOT analysis concentrate on the main ones, where most of the plain are and the agricultural reuse potential is therefore higher. The area considered for the Italian pilot involves Piemonte, Lombardia, Emilia Romagna, Veneto and includes the large part of the most important towns, industrial and agricultural areas in Northern Italy. In the study area operate 710 Waste Water Treatment Plants equipped with tertiary treatment technologies (ISTAT, 2015). Intensive farming, cattle and pig breeding are widely practised in this area.

About 23 million people, a third of all Italian citizens, live in the Po Valley. In the Po river basin are located ten cities with populations surpassing 100,000 units, as well as Turin and Milan which both overpass 1 million persons. In many areas, the population density (355 inhab. /km<sup>2</sup>) is almost double compared to the national average (203/km<sup>2</sup>).

The Po valley draws the Italian economy with a GDP that reaches 738 billion euros, exceeding nations such as the Netherlands, Sweden or Poland. The fertility of the soil, the abundance of water, the ease of communication routes has favoured the development of economic activities. All branches of industry are widely represented; the major poles are the metropolitan areas of Milan and Turin, but along the whole extension of the two piedmont axes there are industrial centres, which are not lacking even in the intermediate areas, particularly in Veneto, where industrialization has spread so uniformly in the territory. The Po river basin today accounts for 40 % of the nation's gross domestic product but suffered serious environmental consequences through the poor water management, industrial and sewage pollution, and agricultural runoff.

## SWOT Analysis

The Po river basin was not included in the previous SuWaNu project (2012). SuWaNu Europe SWOT departs from the SWOT developed in the former project and the present exercise adapts the different aspects identified in other regions in 2012 and reclassify them following the three categories explained above: market-related, product-related and social & governance.

In the Italian pilot, the SWOT questionnaire applied for the most similar area, Spain, has been used as basis for the discussion and then adapted to the Po river basin conditions.

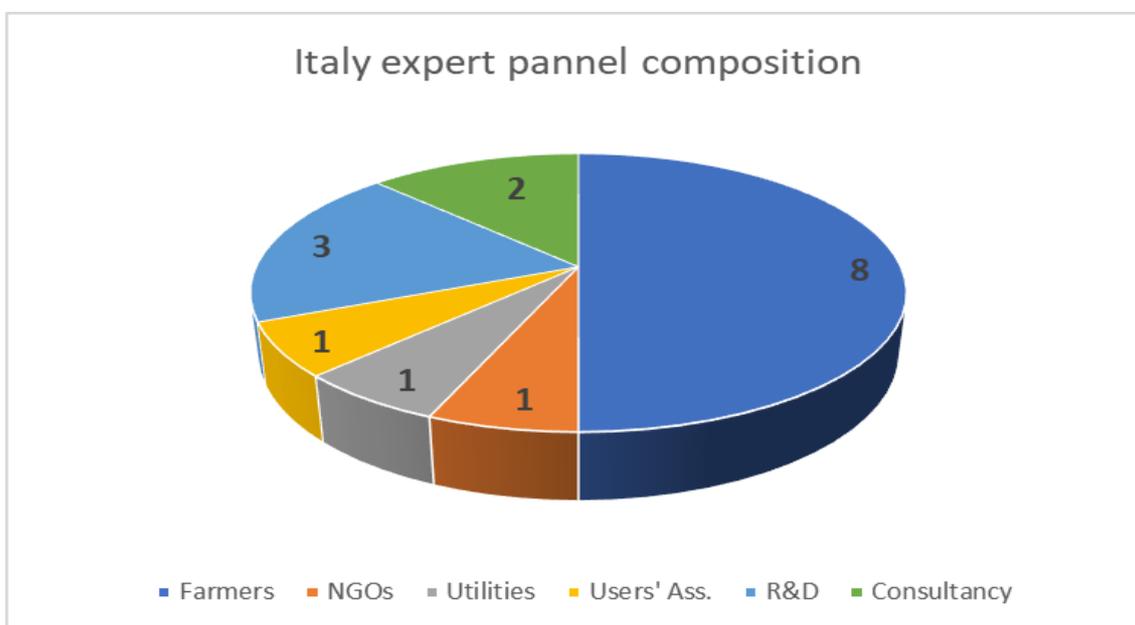
This section makes a description of the main findings of the SWOT analysis done during the consultation process. The first step in this updating process was classifying the existing aspects in the new categories. Secondly, the SWOT was sent to different internal and external experts. The aim of this step is to be reconsidering the suitability of the aspect considered by the Spanish SWOT and identifying new aspects typical of the Po valley, not included in the previous SuWaNu project (2012).

SWOT was discussed among Italian experts, whom comments has been utilised to modify the Spanish document. All the comments were discussed by the Italian partners and the different aspects considered. In the following pages, you could see the different aspects classified

following the classical SWOT schema: strengths and weaknesses (internal) and opportunities and threats (external).

The evaluation of the relevance of each aspect was achieved with the use of a questionnaire. First of all, the different aspects were translated into Italian. Italian partners discussed the most relevant aspects to ask for and a questionnaire was developed using google forms. The Italian partners identified a list of actors pertaining to the categories Farmers, Farmer Ass., Water Utility, Consumers, R&D, Consultant. The questionnaire of the Italian cluster is available in the following link: <https://forms.gle/KzFTuXtmEfUCSbzi9>. The questionnaire final version was sent to the identified actors integrating the expert panel. We obtained 16 answers.

To evaluate the relevance of every aspect, they were classified from 1 (not relevant) to 7 (very relevant). The answers were later harmonised with the other SuWaNu partners questionnaires results, using a Linkert 5 ranking. The conversion from 1-7 to 1-5 has been done as follows: =If(Score<3,1,If(Score=3,2,If(Score=4,3,(If(Score=5,4,If(Score>5,5)))))). This conversion has increased the impact of the extreme categories 1 and 5, incorporating the very bad or good opinions in a more general not relevant or very relevant.



Then the most relevant aspects of each category of the SWOT analysis were included in the following discussion. The key actors that answered the questionnaire belong to the following groups: farmers (8), members of NGOs (1), members of utilities (1), users associations (1), R&D knowledge providers (3) and agri-food/utilities consultancy firms (2).

Following the answers received the most important aspects were identified. This allows Italian partners identified the aspects that need more attention in the regional strategy.

## STRENGTH

General Aspects	Specific Aspects	Po river region
<b>Market-related</b>	Economic aspects	S11. Previous success stories successfully disseminated (EU level) show the positive economic impacts
		S12. Previous success stories -local pilots to assess the real scale of economic impacts
	Water availability	S13. New technologies are needed to support water reuse
	Markets	S14. Consumer/society perception of water reuse
		S15. Water reuse capability to innovate and create trust and new markets
<b>Product related</b>	Technical aspects	S16. Water after the treatment is respectful of the environment
		S17. Water reuse as measure for CCH adaptation
		S18. Water regenerated for reuse in agriculture
	Technological transfer	S19. Trust in available technologies for water reuse
		S20. Capability to create EU intersectoral technological cooperation
		S21. Adequate training of all the subject involved in the reuse activities
<b>Social &amp; governance</b>	Social aspects	S22. Effective communication
		S23. Effective and constructive dialog among EU stakeholders
	Regulators	S24. Water quality standards defined by National legislation
		S25. Water quality standards defined by EU legislation
	Management	S26. Availability of technologies allowing to reduce env. Impacts
	Environmental	S27. Water regenerated for restoring riverine ecosystems
		S28. Water regenerated for preserving rural landscape

## WEAKNESSES

General Aspects	Specific Aspects	Po river region
<b>Market-related</b>	Economic aspects	W11. Regenerated water price
	Water availability	W12. Limited amount of regenerated water available
	Markets	W13. Bad reputation of water reuse
		W14. Lack of trust & unavailability to trade
		W15. High competition on international market
<b>Product related</b>	Technical aspects	W16. Energy use for water treatment
		W17. Need to pump, transport and storage
		W18. Need of new infrastructures
		W19. Actual limited availability is caused by non-adequate treatment level
	Technological transfer	W20. Current laws effectiveness promoting water reuse in agriculture
<b>Social &amp; governance</b>	Social aspects	W21. The actual treatment level is sufficient for restore riverine ecosystems
		W22. Too little farmer size
		W23. Lack of environmental consciousness
		W24. Lack of willingness to undertake necessities reforms
	Regulators	W25. Current laws effectiveness to protect consumers
		W26. Current laws effectiveness to protect environment

## OPPORTUNITIES

General Aspects	Specific Aspects	Po river region
<b>Market-related</b>	Economic aspects	O11. Incentives for extra treatments and distribution costs
		O12. Incentives for farmers
		O13. Circular Economy and Zero Waste policies
		O14. Higher water pricing of conventional water sources
	Water availability	O15. Interconnection with water consuming sectors as i.e. tourism
	Markets	O16. Italian law on water reuse generate consumer's trust
O17. Increasing market share of organic food		
<b>Product related</b>	Technical aspects	O18. Water reuse limited to drought periods
		O19. Multifunctional or dedicated infrastructures
		O20. Relevant for organic agriculture
		O21. Relevant for industrial or non-food crops
		O22. Nutrient recovery from treated water
	Technological transfer	O23. Concerns about alternative water sources uses
		O24. EU standards and regulation for water reuse
		O25. Existing water reuse for irrigation tradition
<b>Social &amp; governance</b>	Social aspects	O26. Farms are close to urban settlements
		O27. Access to study on water reuse impact
		O28. Increasing concerns about water scarcity
		O29. Increasing CCH awareness

	Regulators	O30. Stringent limits to surface water uptake permission
		O31. Development of new irrigation areas with mixed water sources, reuse compulsory
		O32. EU commitment to promote water reuse
	Management	O33. Cost sharing between farmers and treatment plants
	Environmental	O34. Increasing salinity of groundwater and river deltas
O35. Water reuse to sustain rivers Minimum Ecological Flow		

## THREATS

General Aspects	Specific Aspects	Po river region
<b>Market-related</b>	Economic aspects	T11. Excessive regenerated water costs
		T12. Low agricultural products price
	Water availability	T13. Priority given to reuse in industry or cities
	Markets	T14. Rejection of regenerated water irrigated products
T15. Water reuse utilised as barrier in commercial conflicts		
<b>Product related</b>	Technical aspects	T16. Regenerated water demand higher than production
	Technological transfer	T17. Rigid regulation on water reuse standards
<b>Social &amp; governance</b>	Social aspects	T18. Lack of social acceptance in the Po valley
	Regulators	-
	Management	T19. Other alternative water sources preferred
	Environmental	-

## PEST Analysis combined with SWOT

PEST/SWOT	STRENGTH	WEAKNESSES	OPPORTUNITIES	THREATS
<b>Political aspects (P)</b>	<p>Effective intersectoral communication and constructive dialog among stakeholders will support better regulation at national and EU level. Decision and policy makers are already extending water reuse discussion outcomes to closely related sectors as, i.e., treated waste water disposal in surface natural and artificial water networks.</p>	<p>Enforced laws are not creating the necessary confidence in consumers and citizens, thus negatively impacting on policy makers. To secure adequate protection of consumers and environment policy are pushed to ask for even more stringent safety thresholds, creating real stumbling block to water reuse, often not even justified by a risk assessment and analysis. The most evident impact of that is the lack of willingness to foster the reform process.</p>	<p>Circular economy e zero waste targets can be reached with the contribution of positive impacts and externalities water reuse is expected to generate. The Italian law, although deemed too strict by all the operators, generate consumers' trust and could facilitate interconnection between diverse sectors as tourism (water production higher in summer) and agriculture ( higher demand in the same period and strong local market, zero km). Current EU commitment to boost water reuse in Europe is a unique opportunity to take.</p>	<p>Policy and decision makers want to keep themselves on the safe side, hence too rigid standards and regulation will be adopted to reduce responsibilities and calm down consumers fears.</p>

			<p>The future governance of water abstraction will be influenced by the concrete opportunity to access alternative water sources. Policies supporting irrigated areas expansion, when at least part of the water comes from reuse are possible to be envisaged.</p>	
<b>Economic aspect (E)</b>	<p>Success stories at EU and local level have shown the overall positive economic impact of water reuse. If well communicated and supported the water reuse can boost innovation in the irrigation sector, create new markets and trust among consumers. Reuse in agriculture is expected to support a smooth adaptation to climate change of the irrigated agriculture sector. This will avoid collapsing water</p>	<p>More detailed economic analysis is needed to customize the right level of treatment according to the real risks of impacting on the food chain or the farming long term sustainability. The market acceptance of agricultural product still is matter of concerns among stakeholders, as well as the possible use of</p>	<p>Incentives, upon diverse funding schemas or forms, could be granted to support WWTP upgrade (extra treatments) , distribution networks and farmers. The water reuse must fulfil the requirements of organic food markets as well. Cost sharing among sectors (i.e. farmers and utilities) would make accessible more water resources for agriculture, as far the production</p>	<p>Regenerated water cost is likely to be too high for agricultural reuse, mainly considering agricultural products low price and price volatility on global markets. This difficult situation can instrumental to create commercial barrier through rejection of products irrigated with reused water. The increasing water demand from cities would divert regenerated water for reuse in urban areas.</p>

	<p>demanding crops and the related agri-industrial production chain. Water reuse has recently proved its capability to create intersectoral technological cooperation, at least at EU level.</p>	<p>water quality and related standards as commercial barriers. Water produced for reuse purposes could have too high costs to be carried from both WWTP and farmers. This cost could also be charged on a limited regenerated water production, taking into account the actual situation and the widespread indirect reuse.</p>	<p>costs increase is compensated by clear economic benefit.</p>	
<p><b>Social aspect (S)</b></p>	<p>Positive and valuable ecosystem services will stem from water reuse policies: the water produced for reuse purposes is respectful of the environment and useful to support adaptation to climate changes, i.e. supporting rivers' ecological flows. The water produced for</p>	<p>Farms are in general too little to afford the necessary cropping systems changes water reuse imply. There is a generalized lack of environmental consciousness, fears of negative impacts on the food chain and on human health are prevailing. A not</p>	<p>Existing water use tradition and experience can be utilized to create social acceptance. A non-limited access to studies on water use impact would facilitate better acceptance, besides the increasing concerns about water scarcity and awareness of climate change impacts.</p>	<p>Lack of social acceptance and of good understanding of a complex matter as water reuse, are the main threat in the area. Relative water abundance would push consumers to prefer foodstuffs produced with surface or ground water.</p>

	<p>agricultural reuse can at same time help restoring riverine ecosystems and preserving rural landscapes. Adequate training of all the subjects directly or indirectly involved in the reused water/irrigation/food chain nexus will raise the consciousness of the positive impacts face to low risks water reuse involves.</p>	<p>reasonable zero risks attitude undermine the willingness to reuse water.</p>	<p>Ecosystems and areas menaced by increasing groundwater salinity and salt intrusion from sea flags would benefit of widespread water reuse, as well as rivers' ecological flows.</p>	
<p><b>Technological aspect (T)</b></p>	<p>To support an effective and widespread water reuse new technologies are needed, hence stimulating the water sector to move toward a "fit for purpose" approach. Technologies would be developed in order to fulfil more "clients" requirements, thus designed to reduce overall environmental impacts. Effectiveness and</p>	<p>Important new infrastructures are needed to effectively implement direct water reuse. Water reuse imply extra energy costs, when a tertiary treatment is added at the end of the existing secondary. In the distribution phase is necessary to pump and store the water</p>	<p>WWTP upgrade for safe water reuse need to be driven by fit of purposes criteria. The limited period of reuse, the existence of multifunctional infrastructures on the territory, the possibility to focus on industrial or non-food crops, avoiding sensitive productions as certified organic ones (heavy metals and</p>	

	<p>robustness of treatments and technologies need to be proved and communicated in order to create the very needed trust in water reuse technologies.</p>	<p>coming from a continuous production process but delivered for discontinuous uses. The actual quality level could be not sufficient or excessive for restoring riverine ecosystems, it's really difficult to align agriculture and environment quality requirements.</p>	<p>xenobiotic molecules residuals) are aspects to be carefully considered case by case. The distance from the WWTP and the agricultural areas pose technical problems, but considering the relatively limited amount of water produced, reuse will be probably implemented mainly by peri-urban agriculture.</p>	
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## Discussion and conclusion

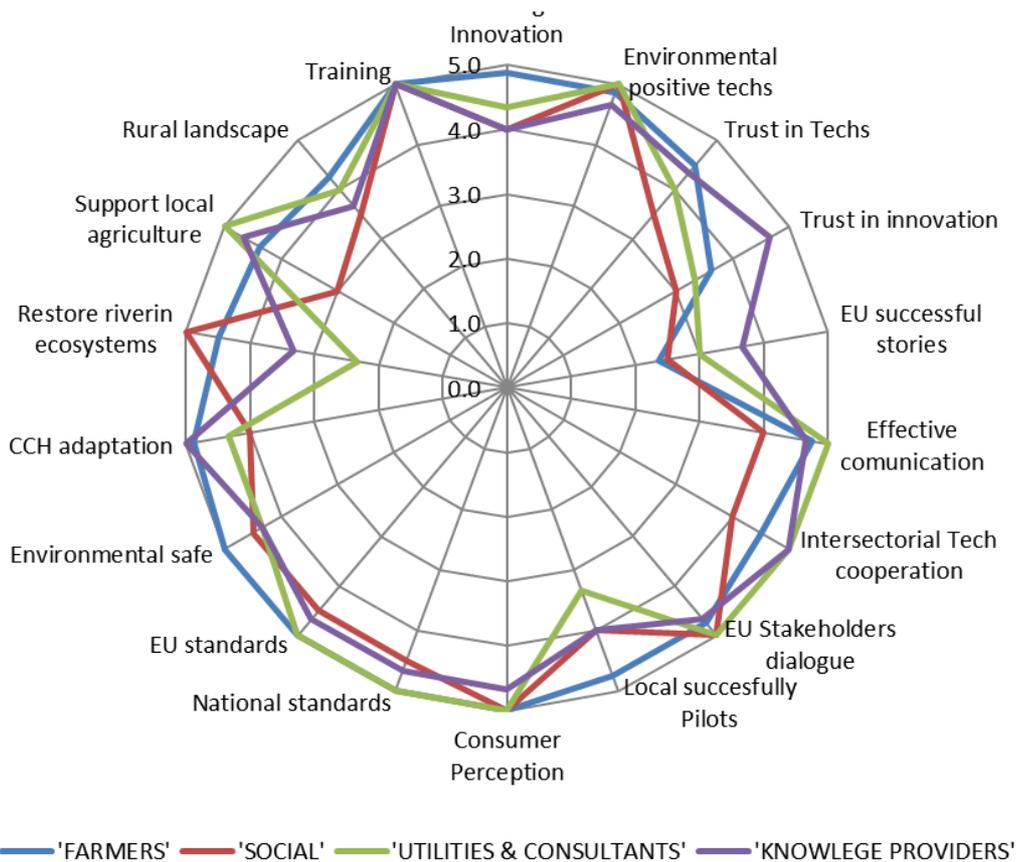
The survey carried out in the Po valley clearly shows quite different attitude and understanding of the water reuse related SWOT. Therefore, we deemed difficult, and perhaps not useful, to analyse the results as the average, or even the median, of the categories of stakeholders involved.

The evaluation criteria for the results obtained can't be different than identify polarities, namely the aspects on which there is a clear strong convergence or divergence.

We considered as "convergent" those aspects having all the stakeholder's categories agreeing (range 4.5 to 5). These aspects are to be considered as policy priorities (no resistance red line) for the short/medium term actions plans. Those with the largest difference (= or >2) among at least two stakeholders' group are the conflictual issues to be tackled urgently or to be put apart (stumbling blocks) when not possible to deal with effectively with the technologies or policy already available.

### STRENGTH

Stakeholders involved in the expert panel found agreement on the need of training, promote



environmental positive technologies, having a stakeholder's dialogue at EU level, consumer perception, national and EU standards, environmentally safe.

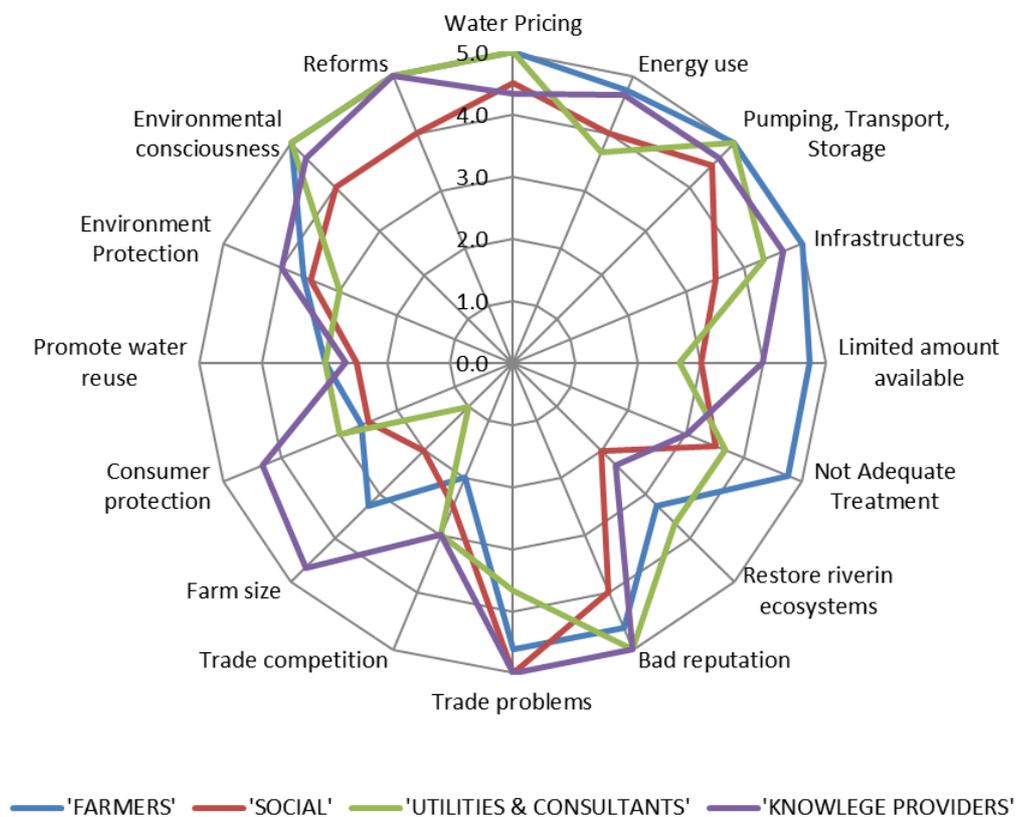
The wide gaps are on the trust in innovation, restore riverine ecosystems and support local agriculture, the latter of course with opposite magnitude particularly for “social” stakeholders, unwilling to let resources go mainly towards agriculture.

**WEAKNESSES**

Agreement is found on water pricing, need to pump and store, and on promotion of water reuse , but at a lower score.

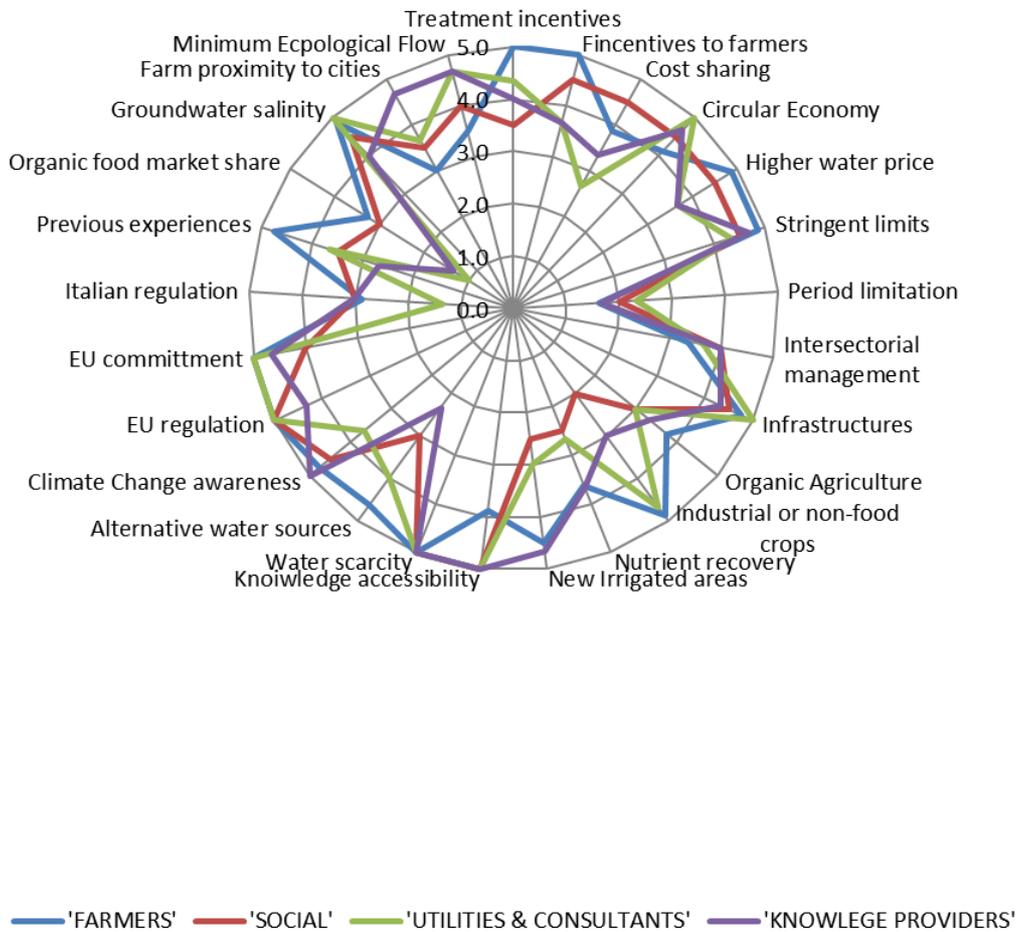
Disagreement were mainly about limited availability, farm size and consumer protection.

On many other crucial aspects there is a sufficiently common understanding about the potential negative impacts. Of relevance the use of energy and the need of infrastructures, beside the bad reputation of water reuse.



**OPPORTUNITIES**

Among the large list of opportunities agreement is found only on international management and



EU regulation , infrastructures and water scarcity.

There is a clear disagreement about cost sharing, limitation to industrial or non -food crops, new irrigated areas, alternative water sources, previous experiences and the impact of the organic food market.

Overall, opportunities are perceived in a very different way, starting from quite far standpoints.

The perception of opportunities is the very basis of motivations and willingness to undertake the necessary efforts and to cope with the unavoidable reforms, which seems not clearly expressed by the survey results.

### THREATS

Concerning threats, there is a strong agreement about the lack of social acceptance and the rejection of products risk.

The disagreement is on rigid regulation, low water production and excessive costs.

The quite far position about water standards and regulations as well as cost depict the existing conflicts between productive technological sectors and “society” strongly influenced by

environmental organisation communication and approach. The lack of objective and agreed risk analysis keep open the door to emotional or “political” choices on technical matters.

