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Sustainability and Water Sensitive Cities: Analysis for Intermediary Cities in Andalusia

Gustavo Bermejo-Martín and Carlos Rodríguez-Monroy *

Department of Industrial Organization, Business Administration and Statistics, E.T.S. Ingenieros Industriales, Universidad Politécnica de Madrid (UPM), calle José Gutiérrez Abascal 2, 28006 Madrid, Spain

* Correspondence: carlos.rodriguez@upm.es

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Abstract: There is currently a phenomenon of global urbanization, where in Europe intermediary cities play a major role by concentrating more than 40% of the European urban population. These types of cities have specific challenges regarding their sustainability and are key to meeting the objectives set out in the UN 2030 Agenda (United Nations, UN), due to their local character and proximity to the citizen. The intermediary cities of Andalusia in Spain, its urban sustainable development and its relationship with water are the object of analysis in this article. They are analyzed through the winning plans in the first call of the Spanish "Integrated Sustainable Urban Development Strategy" (ISUDS). In this process, the citizens are the main actors through their participation in the elaboration of the ISUDS, in which they express the scope of the "hydrosocial contract" of citizenship. The research presented in this article analyzes the latter through a methodological framework applied to the ISUDS, which shows the unequal interest of Andalusian intermediary cities when integrating water into their sustainable development. The article ends with a series of recommendations that make it possible to bring these cities closer to the "water sensitive cities" stage.

Keywords: sustainability; integrated sustainable urban development strategy (ISUDS); societal urban water needs; hydrosocial contract; medium cities; water sensitive cities

1. Introduction

This article focuses on the relationship between four areas of interest regarding sustainability, such as:

1. Intermediary cities and their impact on global sustainability.
2. Water in cities, as a natural asset limiting their growth, also has a crucial impact on sustainability, and its relationship (nexus) with other urban assets such as energy and food.
3. The role of people as active agents in the good achievement of sustainability policies, with their needs to be met. Especially of interest in its relationship with urban water.
4. The region of Andalusia, with its particular geographical context and impact in Spain.

The importance of the research lies in the contribution of knowledge about the current condition of the relationship of citizens with water in the intermediate cities of Andalusia, measured through tools and sources of information that appear therein. We will detail each of the previous points, with a bibliographic review and the context in which they occur.

Concerning cities, currently, more than 55% of the world population lives in cities and many scientific publications predict that the number will exceed 6 billion people in 2050, more than 66% of the world population [1]. For the first time in history, more people will live in cities than in rural areas. This urban population is responsible for more than 70% of the world's GDP and generates more than 80% of the total of high value-added jobs [1].

This population movement makes cities central elements of academic interest; given the numerous new management challenges they face. Among these challenges, the high pressure that will be exerted on the limited natural resources such as water, food, and energy stand out. These three elements have a clear nexus to each other [2]. They are joined by the challenge of management of climate change, since cities have a great impact on it as, by way of example, cities consume 70% of the world's energy and produce 70% of all emissions of greenhouse gases (GHG) [1].

In addition, water is the only natural restriction to the expansion of cities and appears as the only natural limit to their growth and economic development [3]. Greater economic development will involve an increase in the demand for water, food, and energy separately, in addition to a feedback effect between them by the nexus that relates them. This article will focus on urban water as a key element in cities, focusing on what in the scientific literature appears as "Sustainable Urban Water Management" (SUWM) [4]. This concept of SUWM is an integral approach to the water challenge in cities. It is related to other concepts such as "Water Sensitive City" (WSC), "Integrated Urban Water Management, Green Infrastructure, and Water Urbanism" [5]. They are approximations that consider the "entire urban water cycle" and integrate water into the design of solutions for the sustainable development of cities. The framework of "Water Sensitive City" reflects the central role of the citizen in the design of these solutions, and explains how it relates to water, expressing itself through the so-called "hydrosocial contract" [5]. The hydrosocial contract is understood as the values and, often, implicit agreements between communities, governments, and businesses on how water can be used. Physically, they are represented by the infrastructure of water systems [5].

However, not all cities or areas in the world face these challenges in the same way, nor does it affect them with the same intensity. Keep in mind that the greatest urbanization is going to occur in emerging and developing countries. Meanwhile, in developed countries, the percentage of the urban population in most cities is stabilized and, in some places, there is demographic stagnation and a slight setback [1].

There are currently 34 megalopolises (settlements of more than 10 million inhabitants) in the world, of which there is one, Tokyo, that has more than 30 million inhabitants and another eight whose population exceeds 20 million (New Delhi with 25 million stands out). It is expected that in 2030 there will be 41 megacities. At the same time, the number of intermediary cities increases (between 50,000 and one million inhabitants). According to the report, focusing on our closest Western environment, Europe, North America, Eurasia and the region of the Middle East and Western Asia together account for 28% of the world's urban population (10%, 7%, 5% and 6% respectively) and concentrate 30% of both the metropolitan areas and the intermediary cities of the world [6].

Cities can be classified according to factors such as size, functionality, geographical location, services, and economy among others, but for the purpose of this research here we found it appropriate to follow the classification of the Gold IV report [7], which follows the quantitative population criterion (number of inhabitants), defining ranges that allow classifying with sufficient flexibility both Asian cities and European cities, according to their particular idiosyncrasies. The intermediary and small cities (less than 50,000 inhabitants) in Europe contain more than 70% of the urban population in this region [6]. The same happens anywhere in the world, where only intermediary cities represent at least half of the world's urban population. Therefore, given the critical mass of the population and physical space occupied, any policy that aims to be successful in the face of urban challenges must take into account these intermediary cities. That is, it must present a markedly local character, especially when we consider urban water.

On the other hand, "around 40% of the urban population living in intermediary cities live in strips that extend up to 100 or 150 km from the coast, a situation that has a decisive influence on urban development processes" [7]. Therefore, the presence of water in the city's environment takes on special relevance.

The value of intermediary cities stands out as a condition of intersection spaces between the rural and the urban habitats [8], where the water, energy, and food nexus have a major influence, [2].

These urban poles have a high impact on how supply chains of products are established, from rural areas to the coast, to metropolises and peripheries and, therefore, are the local patterns of consumption and production that are decisive for achieving sustainable urban development. That is, its citizens play a decisive role because the resilience of this type of city is based on the strength of its identity, its culture, and its defense of diversity. Therefore, sustainable development and the role of the citizen in its achievement, are presented as one of the key nexuses for this type of city.

Another fact to be considered is that the population growth in this type of city in Europe, specifically in those with less than 300,000 inhabitants, has been 0.24% between 2000 and 2015, and it is expected that it will be 0.01% between 2015 and 2030 [9]. They present practically no growth so that the pressure on natural resources will not have a demographic cause. In fact, one of the challenges of this type of city will be to avoid the migration of young people to large cities, to try to avoid the aging of the population, and the loss of economic dynamism. One of the pillars to retaining young people is offering a higher quality of life, a factor that is directly related to the city's livability [10]. In addition, they need job opportunities, which implies a good economic situation in the city. That is, they need economic development that they will have to combine with the sustainability of their natural and environmental assets, reaching a balance between sustainability and habitability [11].

An important aspect of intermediary cities is that they tend to present deficits in their infrastructure and services related to water, sanitation, electricity, and urban and interurban mobility [7], due in part to the marginalization in the budgetary transfers suffered by their local governments against other state or autonomous administrations. Therefore, they present a deficit of economic resources and financing that conditions their development and that any strategy of sustainable development must take into account.

Another of the focus of the article is in the geographical context of the region of Andalusia, in Spain, from which we reflect the following data of interest for our study [2].

For all these reasons, this typology of cities presents enough challenges to attract our interest and focus this article on the study of the role of urban water in the sustainable development plans of the intermediary cities of the region of Andalusia, in Spain:

1. This zone represents an important part of the critical mass of the country's population. Andalucía has 8.4 million inhabitants, 18% of the total Spanish population, the most populated region of Spain [2].
2. It is the second in extension with 87,600 km^2, which represents 17.3% of the national territory.
3. They have strong rural-urban intersection nature, with a clear nexus between water, energy, and food. The Andalusian agricultural sector accounted for 5.1% of GDP (Gross Domestic Product) in 2016.
4. Agriculture is highly dependent on water, given that there are one million hectares (about 4.4 million in total in the region) devoted to irrigated agriculture in Andalusia, which is 29.3% of the total irrigated land in Spain. However, it is very concentrated around the Guadalquivir basin, which accounts for 86% of the irrigated land in Andalusia.
5. In addition, irrigated agriculture brings together 63% of Andalusian agricultural employment, which has a great social and economic impact.
6. Andalusia has a very important share of Spain's coastal kilometers, with many cities located on the coast or nearby, and an economy very linked to this geographical situation, through tourism, fishing, or trade.
7. Water has been very present in their culture.
8. Andalusia has been the first region to receive funds from the assigned "Integrated Sustainable Urban Development Strategy" (ISUDS) plans.

Therefore, due to economic impact, extension, demography, presence of water in its economic activity, Andalusia is a focus of first level interest regarding sustainability.

We maintain that, in Spain, one of the mechanisms that best reflect the expression of citizens' public behavior regarding sustainable urban development is the ISUDS. The ISUDS follow the line of involving citizens in the identification of local problems and involving them in their resolution, in a "bottom-up" approach, improving "citizen engagement" [12].

These ISUDS plans present public participation that covers the stage of information to the citizens, the consultation to them and an active implication in participating in the decision-making process and public control of the latter [13]. Through the analysis of the ISUDS, we can obtain a picture of the value and commitment of citizens towards the water of their city [14].

This methodological framework, in a summarized way, is composed of a continuum of stages, with non-watertight borders between them, and with a mixture of elements of each other. There are six possible city stages with different evolution of hydrosocial contract [15]:

1. Water supply city: its origin is around 1800. The hydrosocial contract implicitly promises the delivery of unlimited, safe, and cheap water volumes from a benign environment to a rapidly growing urban population.
2. The city with sewerage and sanitation (Sewered City): by 1890, the first mechanisms of health protection were established, through sanitation services that direct waste streams towards a benign environment. The structure of the hydrosocial contract remains unchanged, with the addition of new sanitation infrastructure.
3. The city with drainage (Drained City): around 1950, after the second World War, the first protection services against storm water were deployed to protect the city against floods. The structure of the contract remains unchanged, with the expansion of service delivery functions in the hands of centralized authorities and institutions. However, little by little, local governments were progressively involved, as urban areas were established to lead a stable transition to a more complex hydrosocial contract involving multiple urban service providers.
4. The city with waterways (Waterway City): the appearance of the social current of "environmentalism" for the protection of the environment, in the 1960s. Measures were taken to reduce the entry of pollution into different waterways and water resources. Discharges from waste treatment plants and industrial processes were regulated, and septic tanks were replaced by centralized sewerage systems. Science calibrates the impact of storm water pollution as a diffuse source of pollution, and new technologies such as "wetlands" and "bio-filtration" systems were being developed to protect receiving waterways from contaminated water. However, the quality of storm water is not managed in a massive way. At cognitive and normative levels, storm water pollution is a diffuse problem that cannot be solved by centralizing technologies or by the government control mechanisms that were adopted in the previous hydrosocial contract. This stage suffers from a lack of an adequate financing model and of a decentralized technology operation and management plan.
5. The city based on the water cycle (Water Cycle City): increasing regulatory acceptance of the need for greater social, economic, and environmental sustainability. The approach towards management of the integral water cycle, which involves water conservation and diverse water supply adjusted to the purpose of its use. This idea involves using water sources of different quality: rainwater, storm water, sewage, seawater etc. Each one for the most appropriate use (potable, irrigation, industry, homes) in a different range of scales, with sensitivity towards the cycles of energy and nutrients and contingent on the protection of the health of the different waterways. This scope complements the objectives of security of supply and protection of the different ways, where water sources are reaching the limits of sustainable exploitation. The regulatory dimension will entail the co-management of the water cycle between businesses, communities, and government with the sharing of risk and diversified instruments between private and public initiatives. Cognitively, the actors will be involved in interdisciplinary and multi-agent learning to deliver diverse and flexible solutions. In this phase, there is a debate regarding the role of centralized or decentralized supply of recycled water and its different

application scenarios. The administration and governments choose to respond to the drought with the expansion of centralized systems, with the controls and promises implicit in the old contract; more than to support the co-existence of centralized and decentralized systems and new forms of co-management with the community and private sectors.

6. Water sensitive city: there are currently no examples of this model. The hydrosocial contract would integrate here the normative values of repair and protection of the environment, security of supply, flood control, public health, leisure, habitability, and economic sustainability. The communities will be led by the normative values of intergenerational equity protection with respect to natural resources and ecological integrity, as well as the concern that the community and the environment are resilient to climate change. The social capital will be favorable to reflect a community committed to a sustainable lifestyle. Technologies, infrastructure, and urban forms will be diverse and flexible, designed to reinforce sustainable practices and social capital, recognizing the implicit link between society and technology.

The ISUDS, must be understood within a framework of action with three levels [16]: local, national, and global. These levels are articulated in the following public instruments, all of them interrelated:

1. Agenda 2030: Sustainable Development Goals (SDG) of the UN.
2. Europe 2020 strategy, for smart, sustainable, and inclusive growth.
3. New Urban Schedule (NUS) and Spanish Urban Agenda (SUS).
4. Urban Axis within the Sustainable Growth Operative Program (SGOP) 2014–2020.
5. ISUDS Programs: calls for October 2016 (first), May 2017 (second), and May 2018 (third, in the final resolution phase).

In September 2015, the Sustainable Development Summit took place, within the framework of the United Nations (UN), where the Agenda 2030 was approved). This Agenda contains 17 universally applicable goals to achieve a sustainable world by 2030. The 2030 Agenda is the UN roadmap towards sustainable development, while the Paris Agreement is on climate change [1]. This Agenda reflects the centrality of water in achieving sustainable development and reserves SDG 6 for its treatment. Although the achievement of SDG 6 is linked to other objectives, in this article we highlight its alignment with SDG 11, which seeks to "make cities and human settlements inclusive, safe, resilient and sustainable."

On the cities, in a more concrete way, the New Urban Agenda (NUS) materialized emerging after the agreement reached on the SDG. Its application is considered essential for the success of the 2030 Agenda. The NUS [1] extols the dimension of the 2030 Agenda and is based on five axes, of which axis 3 "Environmental Sustainability and Sustainable Urban Development" is the one with the greatest impact, due to the focus it places on consumption and production patterns, pollution, and natural disasters and climate change. All of them are of special relevance in the case of urban water management. At a global level, the NUS was adopted in October 2016, in Habitat III, the Third United Nations Conference on Housing and Sustainable Urban Development [6].

The 2030 Agenda and the NUS collect a global perspective. It is necessary to land both in a more local context, to be successful, mobilizing local energies and resources. The Spanish Ministry of Public Works is working on this task, which, focusing on the SDG11, has developed the Spanish Urban Schedule (SUS).

In addition, Spain is integrated into the European Union and as such, it must host the closest level of global action expressed in the Europe 2020 Strategy, which includes the importance of sustainable urban development and the contribution of cities to smart, sustainable, and inclusive growth in the European Union, whose financial support will be made through the European Structural and Investment Funds (ESIF), providing more than 5% of the resources of the European Regional Development Fund (ERDF).

This has translation at the Spanish level through the General Directorate of Community Funds of the Ministry of Finance and Public Administrations, which has programmed an Urban Axis within the Sustainable Growth Operative Program (SGOP) 2014–2020, dedicated in its entirety to financing

lines of action for Sustainable and Integrated Urban Development. The Urban Hub has been endowed with 1,012,754,015 euros of ERDF aid for the entire period and has been directed to municipalities or groups of municipalities that constitute an urban functional area, with a population of more than 20,000 inhabitants. All this can be seen in detail on the basis of the first call for the selection of Sustainable and Integrated Urban Development Strategies (ISUDS), as it is included in Order HAP/2427/2015 [17].

The ISUDS plans are instruments of strategic development of the city in the style of the recommendations of UN [18] and are the expression of the level of Spanish local action and contemplate the following five challenges: economic, environmental, climatic, demographic, and social, which favor Sustainable and Integrated Urban Development. In addition, they put special emphasis on articulating mechanisms of citizen participation and social agents. This last point is in line with the global Charter-agenda of human rights in the city [19], which takes up the idea of a new social contract between citizens and public institutions, based on two related pillars: "the right to the city" and the "co-production of the city."

The ISUDS plans focus on the intermediary cities, and in that sense also follow the wake of the general objectives pursued in the declaration of [8], although the ISUDS are prior to it. To frame in the general context of the needs of sustainable development, the financial effort involved in the ISUDS plans is a worthwhile first approximation, although not enough [20].

In the first call, October 2016, the ISUDS put attention in "cities or functional areas larger than 50,000 inhabitants with a maximum aid to allocate for operations to co-finance 15 million euros. For cities or functional areas larger than 20,000 and smaller than 50,000 inhabitants, the maximum aid is 5 million euros" [17].

In addition, the submitted ISUDS plans had to implement at least two of the following Thematic Goals (TG) of the following SGOP:

1. TG2: Improve the access, use, and quality of information and communication technologies. Between 10% and 20% of the total aid.
2. TG4: Encourage the transition to a low-carbon economy in all sectors. Between 20% and 30% of the total aid.
3. TG6: Conserve and protect the environment and promote the efficiency of resources. Between 25% and 35% of total aid.
4. TG9: Promote social inclusion and fight against poverty. Between 25% and 35% of total aid.

In the case of actions in the field of water within the city, the most directly applicable thematic objective is the TG6 [17]. In the case of urban water, the TG6 could reflect the promotion and real adoption of alternative technologies for the supply and efficient use of water within a "fit-for-purpose" philosophy, more connected to the interests of citizens [21]. In that sense, the TG6 could reflect the real interest of citizens in the deployment of new developments, within the ISUDS, such as rainwater use systems. It would be closer to the citizen's engagement than to the simple perception [22].

However, in addition, it is necessary to highlight that the TG2 collects the technological endowment that facilitates the management platforms that contribute to the city being intelligent, what has come to be called "Smart City" within the strategies of sustainable urban development. This is related to what has come to be called "Water Smart Cities" [23] or to the concept of "Smart Water Management" [24], relating water to "Information and Communication Technology" (ICT).

In TG4, for the purposes of urban water, all the actions that supposedly impact the energy-water nexus would be collected [2]. Finally, the TG9 would reflect those strategies more linked to the social and economic aspect of urban water of the hydrosocial contract of citizenship [25].

In the first call, October 2016, Andalusia was the Spanish region with the most ERDF help, with a total of 240,992,000 euros, which represented 32.97% of the total. In the second call, Andalusia was again the Spanish autonomous region with more help, with a total of 103,282,000 euros, that is, 36.64% of the total. The same situation was repeated in the last call, still in the process of the final resolution, Andalusia appears endowed with 189,315,061 euros, which amounts to 53.56%.

2. Materials and Methods

The methodology followed consisted of the bibliographic review of the different ISUDS plans submitted by the municipalities of the Andalusian region to the Spanish administration, and which have been selected in the first round of adjudication, which corresponds to the call of October 2016. Neither the second (May 2017) nor the third call (May 2018) were analyzed. The same methodology could be used to analyze these last two calls and perform a comparative analysis between the three calls. All winning national ISUDS plans are available on the Urban Initiatives Network (UIN) website [26]. In addition, the public documents collected in the State Official Gazette (SOG) where the adjudications of the funds ISUDS for these cities are announced [27,28] were also analyzed.

Although there are other plans in Spain and Andalusia that also include public action regarding water, the ISUDS are the ones that are most directly applicable to the cities, since they are elaborated and given in a local direct context, the other plans being more linked to regional, national, European, and international levels elaborated by the different governments, but without direct participation by citizens. The ISUDS rely on different plans previously prepared by the cities, among which we highlight Agenda21 [29].

All the ISUDS documents analyzed have a similar structure, based on a methodology for the development of the strategy that the municipalities have followed, based on the "Guidelines" offered by the Urban Initiatives Network [26]. Mainly the elaboration process presents two phases.

At first, they all start from the main problems detected and challenges; they carry out an integrated analysis (physical environment, climate, energy, economy, and demography among others) where their main strengths, weaknesses, opportunities, and threats are determined, and from whose final diagnosis strategic challenges arise, which will be faced thanks to the main assets of the city (historical, urban, cultural, and natural heritage).

Based on these principles, the second phase of elaboration is entered, where a strategic vision for the scope of action is determined and the implementation strategy is configured in an integrated manner with a goal of balancing between investment in urban infrastructure with a perspective of sustainable and efficient growth and services for the socio-economic development of the population (employability and entrepreneurship).

The strategy is concretized through a Strategy Implementation Plan (SIP) that contains at least: (a) the typology of lines of action to be carried out to achieve the defined strategic objectives; (b) a schedule, which includes the temporary orientation planning of the actions to be carried out during the period of validity of the Strategy; (c) a budget, which includes indicatively the different sources of financing that are contemplated to implement the strategy designed; and (d) productivity indicators and online monitoring with the SGOP.

Both stages were designed with the participation of all urban actors, an inescapable circumstance in a truly strategic urban process, such as political parties with municipal representation, municipal technical teams, social and economic agents and citizenship, especially neighborhood, cultural, social, educational, and sports organizations, among others. The participation of each social agent (stakeholder) followed similar patterns, and they usually entered both phases. In the process, different techniques and tools for communication and dissemination of similar ISUDS were used for each municipality:

1. Personalized interviews with those responsible for the area and other actors involved in each town hall.
2. Sectoral tables with different interest groups and activity sectors (commerce, culture, mobility, environment, tourism, ICT, etc.), either through open workshops or through the sector councils of each city.
3. Cross-sectional tables, with interest groups from different sectors for the identification of synergies and general city councils, such as the social council, territorial councils (districts of each city), professional and neighborhood associations, trade unions, businessmen, etc.

4. On-line surveys that will allow conducting opinion polls to all citizens and key agents. The survey was sent through new channels/communication tools, such as social networks and WhatsApp.
5. Meetings of the High-Level Committee for strategic decision making. It is made up of those responsible for the City Council.
6. Ad-hoc tables by the line of action, designed for information and decision making that have to do with the implementation of each line of action of ISUDS.
7. Broadcast portals, through the City Council website and social networks, which also enabled direct access to the different participation processes that were launched.

Regarding the sources of data on which the town halls have been based, to analyze and identify the challenges, potentials, and assets in order to connect this planning background with the thematic objectives financed by the European Regional Development Fund (ERDF) and in line with the specific investment priorities of the SGOP, they have been basically of two types:

a. Primary sources: from the administration itself at different levels (national, regional, local) such as cadastre data, economic and demographic data of population, income, etc.
b. Data sources prepared and processed previously by the municipalities or municipal companies (water companies, electricity, external services, etc.).

In addition, for the preparation of the ISUDS, documentation has been prepared by the administrative bodies themselves, companies, and different stakeholders involved in the process. Among these documents, we highlight the Territorial Planning Plans of Andalusia, the Strategic plans of each province, the urban planning plans of the city, the Agenda 21 of the city, and thematic plans such as sustainable urban mobility and sustainable energy.

That is, the data used is fully valid, given that its origin was the administration itself and specialized agencies in each subject, certified by the local authorities themselves and participating stakeholders.

The two general objectives were, in the first place, to determine to what extent water has been considered in the sustainable development plans of the intermediary cities of Andalusia, reflected in the ISUDS, that is, the relationship between sustainability and water as well as the nexus with other factors (food, energy, tourism). Second, to what degree do citizens express their public commitment to water through the hydrosocial contract. This will be expressed through the actions and practices carried out in the ISUDS regarding water and the aspiration of citizens to obtain results in order to achieve an evolution towards a higher stage of "Water Sensitive City" [15].

In a more concrete way, the methodology followed was inspired by using all or part of some of the tools developed and available in the scientific literature to evaluate qualitatively or quantitatively if any of the three general objectives described above appear on the agenda of the ISUDS plans winners. These tools are based on the development of indices that allow comparing different aspects of sustainability, water uses, resilience, governance, habitability, etc., at a local or global scale.

The most appropriate reference indexes for the subject of this article were found. They are the following: The Water Sensitive Cities Index (WSC Index) of the Cooperative Research Center for Water Sensitive Cities (CRCWSC) [30], the City Blueprint Approach (CBA) of the EIP Water Action Group [31] and the Principles for Water Sensitive Cities of the International Water Association (IWA) [32]. With special care, the application of the CBA to the case of the city of Cape Town was reviewed [33]. We also reviewed the WSC Index application [34].

Likewise, methodologies such as the Multi-Pattern Approach (MPA) were also studied, focusing more on the dynamics of systems analysis and temporary components in transitions towards sustainability, which are beyond the scope of this article. In any case, a good description can be found in [35].

Methodological proposals which focus on the development of a framework to identify the sociological roles of water in cities, with the aim of supporting new ways of managing projects and programs around urban water, were also analyzed [36].

Finally, the WSC Index was selected as a basic tool since it provides a general framework for analysis that evaluates three areas regarding urban water [34], with indicators in the three visions closest to the general objectives listed to answer:

1. The stage of the city in the continuum [15].
2. Set of practices as a transition to a "Water Sensitive City" described by Chesterfield et al. [34]:
   (a) Cities as "captors" of water.
   (b) Cities as providers of ecosystem services.
   (c) Cities with citizens and communities that are aware of water.
3. Results to produce improvements in the city regarding:
   (a) Sustainability [37].
   (b) Habitability [10].
   (c) Resilience [38]
   (d) Productivity [34].

The tool presents 34 indicators gathered around seven thematic objectives that represent important attributes of what would be a water sensitive city from the areas of social, technical, and ecological action. Each indicator is evaluated qualitatively in a range of 1 to 5 according to the current situation of the city that best fits the description [34]. The objectives of the tool for which it was designed are to support the strategic planning processes and the decisions to be made, to promote inter-city learning and to enable national governments to evaluate the trajectories of urban water management in the different cities allowing benchmarking [32].

On the other hand, it is not intended to apply and give a score to each indicator of the WSC Index on the winning ISUDS plans [32], since it would require a research strategy with questionnaires and interviews and subsequent joint meetings with the stakeholders of each city, which is beyond the reach of the research team of this article. The reasons are in the fact that the ISUDS were awarded in October 2016, in which the execution of many of them started at the end of 2016 or the beginning of 2017, and that the end of the execution period is delimited by the end of the year 2020 (in some cases even by 2022). It was not considered appropriate to organize any workshop or to send a survey to check the results and interpretation of this article, leaving for further study this line of field research, once the execution of the ISUDS is finished and its real efficiency can be verified. Therefore, the outcomes of the "water sensitive cities" model reflect, in this article, the aspirations of the results to be achieved that will depend on the efficiency in the execution of the ISUDS themselves. In any case, as explained in previous points, the ISUDS themselves were prepared and are being executed and monitored by the stakeholders themselves in different modes of participation, which can ensure that the thematic goals (TG), lines of action, and projects that appear there are those agreed between the different stakeholders based on their interests, dynamics, and bargaining power, and whose most quantitative and objective expression are the different budgets of the Strategy Implementation Plan (SIP) with which urban water has been endowed against other sources of citizen interest regarding its sustainable development as a city. This budget includes both the ERDF funds received by the municipalities, as well as the budget that the municipality itself commits within the ISUDS. Therefore, we also used the budget dedicated to water that appears in the ISUDS themselves as a quantitative tool for measuring the city's commitment to water. We believe that the results obtained through the methodology, tools, data, and sources of information are used to reflect the current status of the hydrosocial contract and the aspiration of each citizen regarding the relationship they want to have with their urban water.

However, we intended to analyze the presence of data and information in the ISUDS plans referring to the WSC Index indicators, which allowed us to detect which of the seven objectives were reflected in the ISUDS and which indicators appear more frequently, as a means to reflect the interest of cities for concrete actions.

Finally, based on the perception of the stakeholders of the cities, collected in the ISUDS itself, we analyzed which are the main key drivers' actuators of the link with respect to urban water [2]. Especially, if the reduction of diffuse pollution (diffuse emissions) in agriculture with nexus with water appears in the ISUDS plans. Or if there are joint actions between water and factors such as food production, irrigated agriculture, the cost of energy, various socioeconomic factors, the conservation of the environment, and indicators of agricultural performance. It is especially important in intermediary cities where there is an overlap between rural and urban character to determine if all these nexuses exist.

3. Results

In the first call of the ISUDS, in October 2016, the Ministry selected as winning cities in the region of Andalusia those that appear in Table 1 below:

Table 1. Winning cities in Andalusia for Integrated Sustainable Urban Development Strategy (ISUDS) 2016. (Source: Authors).

City	Project	Province	ISUDS ERDF (€)	Population
Baza	Baza Sostenible 2020	Granada	5,000,000	20,644
Málaga	Perchel-Lagunillas	Málaga	15,000,000	572,267
Moguer	ISUDS Moguer2020	Huelva	5,000,000	21,302
El Ejido	El Ejido Sostenible 2020	Almería	10,000,000	84,144
Martos	Progresa Martos 2020-6791	Jaén	5,000,000	24,562
La Rinconada	Ciudad Única Rinconada 22	Sevilla	5,000,000	37,755
Algeciras	Algeciras Puerta a Europa	Cádiz	15,000,000	117,964
Conil de la Frontera	Revitaconil	Cádiz	5,000,000	22,063
Huelva	ISUDS Huelva PVPS	Huelva	14,976,552	147,212
Nerja	Nerja Adelante!	Málaga	5,000,000	20,649
Sevilla	ISUDS Norte Sevilla	Sevilla	15,000,000	696,676
Úbeda	UB/BZ 2020	Jaén	10,000,000	51,392
Estepona	Jardín Costa del Sol	Málaga	10,000,000	66,566
Linares	ISUDS Linares Progresa	Jaén	10,000,000	60,290
Diputación Provincial de Málaga	ISUDS Caminito del Rey	Málaga	10,000,000	59,695
Adra	ISUDS Adra	Almería	5,000,000	24,782
San Fernando	La Ciudad Parque Natural	Cádiz	10,000,000	96,335
Puerto de Santa María	ISUDS El Puerto	Cádiz	10,000,000	88,700
Motril	Motril 2020 Motril SI2	Granada	10,000,000	60,870
Jerez de la Frontera	ISUDS Jerez 2022	Cádiz	15,000,000	215,180
Sanlúcar de Barrameda	ISUDS Sanlúcar	Cádiz	10,000,000	67,433
Granada	De Tradición a Innovación	Granada	15,000,000	237,540
Línea de la Concepción	Cosido Urbano de La Línea	Cádiz	10,000,000	63,352
Córdoba	ISUDS Córdoba	Córdoba	15,000,000	327,362

As can be seen in the table of the 24 winning projects, 17 correspond to intermediary cities, according to the typological classification of the Gold IV report [7], which represents 70.8% of the total winning cities. Of these 17 projects, only 11 of them have considered urban water as a factor to be developed in one or another aspect within the ISUDS, which implies 64.7% of the total of intermediary city projects.

The 11 projects of intermediary cities that have taken into account to greater or lesser extent policies and actions regarding urban water in their ISUDS were analyzed from the public documentation provided on the Urban Initiatives Network (UIN) website [20]. Applying the methodology described in the previous point, we used the following tools to obtain results:

1. The water challenges to be solved declared in the ISUDS.
2. The social needs of urban water, declared explicitly or implicitly [11].
3. The main actions to be implemented in the city regarding urban water, framed in one of the TG.

4. If the connection of water with other factors of the economic environment in the sustainable development of the city has been considered.
5. The possible affected WSC Index.
6. The practices developed in the ISUDS that bring the city closer to a "Water Sensitive City".
7. The results and the factors in which the city wants to produce improvement with respect to urban water. They are citizenship aspirations; efficiency results to be achieved, but they are not the final result that can only be measured at the end of the ISUDS implementation (between the end of 2020 and 2022).
8. A budget of the Strategy Implementation Plan (SIP) by activity sectors: where the relative weight of money to invest in action lines in urban water compared to other sectors or assets of the city can be seen.

Table 2 shows the results of the analysis of the 11 intermediary city projects.

Table 3 shows the SIP budget by sectors and the relative weight of water actions in ISUDS. The table shows the expression "Water included" to indicate that in this sector there are lines of action related to water, and therefore, there is nexus between the two.

Table 4 gives the ranking towards "Water Sensitive City" of the winning intermediary cities in Andalusia for ISUDS 2016, from analysis of the former results showed in the rest of the tables, from highest to lowest order.

Table 2. Urban water analysis of the winning intermediary cities in Andalusia for ISUDS 2016. (Source: Authors).

City	Project	Water Challenges	Social Urban Water Needs	Main Actions	Factor Nexus	WSC Index	Practices	Outcomes
Málaga	Perchel-Lagunillas	Floods. Old sewerage network: water overflow. Heat waves.	Flood protection. Water-supported thermal protection. Healthy ecosystems.	Water distribution and sewerage Network remote reading in city. Sewage water depuration. Building retrofitting: water leakage reduction.	Water-Air quality. Water-ICT (Smart City).	2.4, 3.1, 3.2, 3.3, 4.1, 4.2, 5.1, 5.2, 7.3, 7.4, 7.6	Ecosystem Services	Livability Resilience Sustainability
Sevilla	ISUDS Norte Sevilla	Old water distribution and sewerage network. Bad smells related to sewage treatment plant. Heat waves. Water demand reduction. Potable water distribution lacks in "El Vacie" district (30% without potable water).	Potable water. Sanitation. Water-supported thermal protection. Healthy ecosystems. Equitable access to water services.	Grey water reuse in buildings. Bad smell reduction in sewage treatment plant.	Water-Poverty. Water-Air Quality.	3.1, 3.2, 4.1, 4.2, 5.1, 5.2, 7.1, 7.2, 7.4, 7.6	Catchment Ecosystem services	Livability Sustainability
Úbeda	UB/BZ 2020	Water pollution related to agriculture waste. Citizens water literacy. Water and waste reduction in agriculture.	Healthy ecosystems. Water literacy. Water system knowledge.	Hot water from biomass compounds. ICT to monitor and control public buildings (water). Improve water networks.	Water-Energy. Water-Agriculture. Water-ICT (Smart city).	2.2, 4.5, 5.1, 5.2, 5.3, 5.4, 6.1, 6.2, 6.3, 7.3, 7.6	Catchment Water-conscious citizens	Livability Sustainability
Estepona	Jardín Costa del Sol	Potential Floods. High water consumption. Water reuse for golf pitch and green areas. Drought for animals. Citizens water literacy. Uncontrolled sewage waste.	Flood protection. Water literacy. Water system knowledge. Healthy ecosystems. Water-supported public spaces. Enjoyment of water. Aesthetic urban environment.	Citizens' environment literacy. River park construction for leisure and social interactions: green and blue zones. Water channel for canoeing.	Water-Tourism.	2.1, 2.2, 2.4, 4.1, 4.3, 4.5, 5.1, 5.3, 5.4, 6.1, 6.2, 6.3, 7.1, 7.2	Catchment Ecosystem services Water-conscious citizens	Livability Resilience Sustainability Productivity

Table 2. *Cont.*

City	Project	Water Challenges	Social Urban Water Needs	Main Actions	Factor Nexus	WSC Index	Practices	Outcomes
Linares	ISUDS Linares Progresa	Black water reduction. Sewerage construction to reduce inflow water in sewage treatment plant. Flood and pollution risks: Arroyo Periquito Melchor.	Flood protection. Water literacy. Water system knowledge. Healthy ecosystems. Aesthetic urban environment. Equitable access to water services.	Citizens water literacy: water saving. Water reuse in gardens. Soil recovery to reduce pollution. Water treatment reduction. ICT to monitor and control public buildings (water). Improve water networks. Water sewerage and rain networks separation. Water catchment sewer system.	Water-Energy-GHG. Water-Soil Degradation-City pollution. Water-Health. Water-ICT (Smart city).	2.1, 2.2, 2.4, 4.1, 4.2, 4.4, 4.5, 5.1, 5.2, 5.3, 5.4, 6.1, 6.2, 6.3, 7.1, 7.3, 7.4, 7.6	Catchment Ecosystem services Water-conscious citizens	Livability Resilience Sustainability Productivity
San Fernando	La Ciudad Parque Natural	Flood risks. Old sewerage network: pollution due to water overflow. Water sport city as reference to canoeing, kayaking, etc.	Flood protection. Water literacy. Water system knowledge. Healthy ecosystems. Water-supported public spaces. Enjoyment of water. Aesthetic urban environment. Equitable access to water services.	Parque Natural Bahía de Cádiz recovery for leisure and social interactions: green and blue zones. Building retrofitting to reuse rain water in "La Almadraba" city district.	Water-Health-Environment (pollution). Water-Tourism. Water-Energy.	2.2, 2.4, 3.2, 4.1, 4.3, 4.5, 5.1, 5.2, 5.3, 5.4, 6.1, 6.3, 7.1, 7.4	Catchment Ecosystem services	Livability Resilience Sustainability Productivity
Puerto de Santa María	ISUDS El Puerto	Water leakage (above 20%). Sewage water depuration close to limit capacity. Old water networks. Water reuse. Uncontrolled sewage waste reduction.	Healthy ecosystems. Water-supported public spaces. Enjoyment of water. Aesthetic urban environment. Water-based culture and identity.	River recovery and integration in city for leisure and social activities. Aesthetic improvement.	Water-Culture. Water-Energy. Water-Tourism.	2.2, 4.2, 4.3, 4.5, 5.1, 5.2, 5.3, 5.4, 6.1, 6.3, 7.4	Catchment Ecosystem services	Livability Resilience Sustainability Productivity

Table 2. *Cont.*

City	Project	Water Challenges	Social Urban Water Needs	Main Actions	Factor Nexus	WSC Index	Practices	Outcomes
Motril	Motril 2020 Motril SI2	Old sewerage network recovery: overload and flood risks. Water demand reduction. Water pollution. Overloaded sewage treatment plant. Uncontrolled sewage waste. Water leakage. Soil recovery to reduce water pollution. Aquifers salinization risk.	Water literacy. Water system knowledge. Healthy ecosystems. Enjoyment of water. Water-based culture and identity.	Water demand reduction. Motril patrimonio natural: green and blue zones recovery. Improve bathing water quality. Water-ICT (Smart City): garden irrigation smart management.	Water-Environment (sea level augmentation). Water-Energy. Water-Tourism. Water-ICT (Smart City).	2.1, 2.2, 4.1, 4.2, 4.3, 4.4, 4.5, 5.1, 5.2, 5.3, 5.4, 6.1, 6.3, 7.1, 7.3, 7.4, 7.6	Catchment Ecosystem services Water-conscious citizens	Livability Resilience Sustainability Productivity
Jerez de la Frontera	ISUDS Jerez 2022	Water leakage (above 20%). High water consumption. Water reuse for golf pitch and agriculture.	Water literacy. Water system knowledge. Water-based culture and identity.	Citizens water literacy: water as key cultural pillar. Public and private building retrofitting: hot water from renewal energy sources.	Water-GHG. Water-Energy. Water-Tourism.	2.1, 2.2, 4.1, 4.2, 4.3, 4.4, 4.5, 5.1, 5.2, 5.3, 5.4, 6.1, 7.4, 7.6	Catchment Water-conscious citizens	Livability Sustainability Productivity
Línea de la Concepción	Cosido Urbano de La Línea	Integrated Water cycle management. Floods. Old sewerage network: water overloaded and leakage (above 22%). Water pollution. Water robbery. Uncontrolled sewage waste. Beach recovery. Water environment preservation.	Flood protection. Water literacy. Water system knowledge. Healthy ecosystems. Water-supported public spaces. Enjoyment of water.	Water actions will be funded by water utility company, not by ISUDS. Hot water from renewal energy sources (solar panels). Integrated water cycle management improvement (especially sewerage network).	Water-Energy.	2.2, 4.1, 4.3, 4.5, 5.1, 5.2, 5.3, 5.4, 6.1, 7.1, 7.2, 7.4, 7.6	Catchment Ecosystem services	Livability Sustainability

Table 2. *Cont.*

City	Project	Water Challenges	Social Urban Water Needs	Main Actions	Factor Nexus	WSC Index	Practices	Outcomes
Córdoba	ISUDS Córdoba	Reuse water for agriculture and garden irrigation. Integrated water cycle management improvement. High water consumption. High energy consumption in water treatment related to pumps.	Water literacy. Water system knowledge.	Water distribution and sewerage network remote reading.	Water-Energy. Water-ICT (Smart city)	4.1, 4.2, 4.4, 7.3, 7.6	Catchment	Sustainability

Table 3. Strategy Implementation Plan Budget by sectors of the winning intermediary cities in Andalusia for ISUDS 2016. (Source: Authors).

City	Project	SIP (€)	SIP Water (€)	SIP Water/Total (%)	Smart Cities TG2 (€)	Energy Efficiency TG4 (€)	Tourism and Culture TG6 (€)	Public Spaces TG6 (€)	Environment Quality TG6 (€)	Building and Public Equipment TG9 (€)
Málaga	Perchel-Lagunillas	25,000,000	1,042,000	4.17%	699,750 (Water included)	3,577,724	950,000	7,057,750	342,250 (Water included)	2,000,000
Sevilla	DUSI Norte Sevilla	18,750,000	1,124,000	5.99%	750,000	3,337,000	4,326,500	624,000 (Water included)	500,000 (Water included)	4,800,000
Úbeda	UB/BZ 2020	18,750,000	4,663,080	24.87%	787,280	1,892,280 (Water included)	2,232,000	Included in Culture	2,770,800 (Water included)	6,430,280
Estepona	Jardín Costa del Sol	17,919,200	2,100,000	11.72%	3,200,000	1,500,000	1,100,000	3,100,000 (Water included)	1,150,000	1,400,000

Table 3. *Cont.*

City	Project	SIP (€)	SIP Water (€)	SIP Water/Total (%)	Smart Cities TG2 (€)	Energy Efficiency TG4 (€)	Tourism and Culture TG6 (€)	Public Spaces TG6 (€)	Environment Quality TG6 (€)	Building and Public Equipment TG9 (€)
Linares	EDUSI Linares Progresa	18,750,000	9,489,527	50.61%	1,500,000 (Water included)	821,384	312,500	788,530 (Water included)	5,000,080 (Water included)	2,200,917 (Water included)
San Fernando	La Ciudad Parque Natural	18,750,000	6,438,600	34.34%	918,000	4,284,000	Included in Public Spaces and Environment Quality	4,488,000 (Water included)	1,020,000 (Water included)	930,600 (Water included)
Puerto de Santa María	EDUSI El Puerto	18,750,000	6,500,000	34.67%	1,352,000	1,950,000	1,750,000	Included in Environment Quality	6,500,000 (Water included)	4,000,000
Motril	Motril 2020 Motril SI2	18,750,000	3,010,800	16.06%	1,346,800 (Water included)	1,766,000	2,288,000	2,524,000	166,4000 (Water included)	3,266,000
Jerez de la Frontera	EDUSI Jerez 2022	18,750,000	1,133,500	6.05%	1,692,500	1,133,500 (Water included)	3,200,000	Included in Environment Quality	2,150,000	1,260,000
Línea de la Concepción	Cosido Urbano de La Línea	18,000,000	1,242,000	6.90%	1,818,000	1,242,000 (Water included)	2,400,000	2,800,000	1,100,000	4,159,500
Córdoba	EDUSI Córdoba	18,750,000	618,750	3.30%	618,750 (Water included)	1,968,750	3,960,000	840,000	1,200,000	840,000

Table 4. Ranking towards "Water Sensitive City" of the winning intermediary cities in Andalusia for ISUDS 2016. (Source: Authors).

City	Project
Linares	ISUDS Linares Progresa
Motril	Motril 2020 Motril SI2
Estepona	Jardín Costa del Sol
Úbeda	UB/BZ 2020
Puerto de Santa María	ISUDS El Puerto
San Fernando	La Ciudad Parque Natural
Jerez de la Frontera	ISUDS Jerez 2022
Línea de la Concepción	Cosido Urbano de La Línea
Sevilla	ISUDS Norte Sevilla
Málaga	Perchel-Lagunillas
Córdoba	ISUDS Córdoba

4. Discussion

Before beginning the analysis of the results obtained, we would like to write a brief comment on the structure of the ISUDS in which they are sustained. They all have the same structure, which facilitates the comparison between different cities and data extraction. However, on the contrary, although the chapter of analysis of the problem of the city follows a holistic, integrated perspective of all the areas (demography, economy, environment, etc.) where the environmental and climatic area has an important weight, the same does not happen in the proposed Strategy Implementation Plan (SIP). We detect a gap between the declared aspirations of the city and the actions to be carried out in many of the areas included in the SIP. In this plan, a nexus between the actions, a holistic action of all the conditioning factors of sustainability are not contemplated in most cases. In addition, the structure of TG facilitates some tight compartmentalization of these actions. We also clearly detect that the actions towards the area of energy and mobility prevail in the objectives to be covered by the ISUDS. The holistic perspective in the implementation of the plans would be something to improve.

From the analysis of the results shown in the previous tables, considering the documents published in their ISUDS and analyzing TG of the ISUDS, the closest objective by theme to urban water is the TG6, many of the actions of the city interest towards a "water sensitive city" should be embedded in this area. The majority TG6 in the 11 intermediary cities is to have more green areas, either in the form of gardens or in the form of urban gardens. The objective is to achieve 10–15 m^2 of green areas per inhabitant as recommended by the World Health Organization (WHO) since it will result in greater health of citizens. However, the ISUDS have not taken into account, in a way stated in the plan, the impact that the development of more green areas could mean on greater water consumption and, therefore, greater pressure on the availability of water. No numerical study of its impact appears. Only the plans of Linares and Motril expressly include the reuse of water for irrigation and gardens, as well as intelligent irrigation control systems to support the development of more green areas for the city, but without any calculation of water impact.

Given the coastal and/or fluvial nature of most of the Andalusian intermediary cities, the recovery of river banks and beaches also appears in said TG6. The plans of Estepona, Motril, San Fernando, and Puerto de Santa María stand out.

In total, of the 11 ISUDS plans, all except the Córdoba and La Línea de la Concepcion plans collect actions on urban water under the umbrella of TG6.

Regarding the "Water Smart City" character of the city, collected in the development of TG2, only the plans of Malaga, Úbeda, Linares, Motril, and Córdoba highlight specific actions of ICT

technologies application on urban water management, monitoring, and control. Málaga on the entire city; Córdoba on its water distribution and sanitation networks; Úbeda, and Linares on water inside public buildings; and Motril with its intelligent irrigation system.

The actions regarding water that impact the development of TG4, are those that apply to the generation of hot water and, therefore, thermal comfort from alternative energy sources (solar panels, biomass) in public buildings. The plans of Úbeda, Jérez de la Frontera, and La Línea de la Concepción stand out in this field. On the contrary, these plans do not consider the possible risk that there is a triggering effect of increased water consumption, because citizens perceive that hot water is "free" or "very cheap" by self-generating the energy that the produces. Tensions can arise between "habitability" and "sustainability" due to the search for greater comfort on the part of citizens. A holistic approach based on obtaining an overall efficiency of provision of "end-use services" (hygiene, thermal comfort) to the citizen has not been taken into account [39].

In an outstanding way, within this area of TG4, Linares presents the only plan with actions to reduce energy consumption in the integral water cycle and, therefore, the reduction of the emission of "greenhouse gases" in the urban water management. It is true that the El Puerto de Santa María plan also includes a good calculation of CO2 emissions by the integral water cycle but does not detail actions that reduce it.

Finally, the ISUDS plans that have actions on the TG9, are those of Málaga, Sevilla, Linares, and San Fernando. These are plans that either attack the aging of water and energy infrastructures on old buildings or improve the pavement of impoverished areas of the city that cause flooding and pollution due to the poor condition of the sanitation and permeabilization network. These problems are clearly linked to the economic sustainability of the city, which either do not present economic growth that allows the renewal of the equipment of the urban furniture, or they present drastic economic inequalities between different areas of the city. All this translates into deficiencies for saving water and leaks.

As can be seen, as a conclusion of the analysis of the TGs, it can be said that most cities tackle several TGs simultaneously with respect to urban water, which is consistent with the philosophy of the general allocation criteria of the ISUDS to achieve greater synergies.

Regarding the social needs of water, expressed through the challenges included in the ISUDS, it should be noted that most of them emphasize the need for greater education of citizens ("water literacy") regarding water and greater knowledge of water management systems ("water system knowledge"), in the sense of a greater understanding of the integral water cycle. This appears in the plans of Úbeda, Linares, San Fernando, Motril, Jérez, Línea de la Concepción, and Córdoba. Some of them had already launched informative plans for citizens on water before the ISUDS proposal. In addition, in a parallel and connected sphere, the plans of Puerto de Santa María and Motril put water on the forefront as a central element of the culture of the city.

It also highlights the fact that in almost all the plans they need to have healthy environments with water as a central element appearing explicitly. It is this connection between water-environment-health which constitutes an important nexus that perhaps can be exploited to lean on other elements to make water more visible within the citizenship.

Aspects related to habitability, such as aesthetics, comfort, leisure and sports factors, are also reflected as needs in the plans of Seville, Estepona, Linares, San Fernando, Puerto de Santa María, Motril, and Línea de la Concepción. One of the explanations could be that these localities have tourism as an engine of economic development, and water is part of the natural asset that serves as an attraction for this market.

It should be mentioned that protection against floods appears as a social need in an area of Spain that does not stand out due to the frequency of rainfall. The reason lies in the age of the sanitation networks, the sharing of networks between rainwater and the black and grey waters that cause frequent overflows in the network as soon as there is rainfall and operation almost to the limit of its capacity of water purification stations. In addition, the pavement of the street is in poor condition, which hinders

the drainage of water and diffuse pollution by dragging dirt. In other words, there is a perception among citizens of the need to renew the water infrastructure in the city due to aging or obsolescence.

In conclusion of the analysis of the social needs of water, we can say that citizens are connected to water through culture, but need more education about aspects related to it to understand the impact of its use on the life of the city.

In the section on water challenges that cities face, they follow the aforementioned lines of the social needs of water. Regarding the latter, and as more concrete elements, the resolution of the problems of bad odors due to the water treatment plants and/or the poor condition or overflow of the sewage networks stand out. In addition, one of the important challenges that appear is the pollution produced by agriculture on water. This makes sense in these types of intermediary cities that are a link between the urban and the rural, especially in a typically agrarian region such as Andalusia.

The main challenge is the reduction of drinking water consumption in households, which in most cases is far from the sustainability recommendation of 100 liters/inhabitant/day. This is a fundamental factor, especially in a region of low rainfall and with agriculture based on irrigation, which therefore adds extra pressure on the water resource. As a factor in favor of keeping consumption under control is the fact that many of the population centers present a vegetative population growth. Although, it is true that most of them are tourist destinations that add a factor of seasonal demographic pressure that makes the management of the integral water cycle difficult. As a positive element, many of these cities declare their intention to implement water reuse plans for irrigation, garden, and golf course irrigation and the implementation of intelligent systems to control the use of water in the city (basically public gardens and buildings).

However, one of the most mentioned challenges is the reduction of water losses in water distribution systems, with more than 20% losses. Both in the public network and in the obsolete equipment of buildings. This requires strong investments in the city's sanitation and distribution networks, which fall under the umbrella of other plans that are not the goal of the ISUDS.

In conclusion, it can be found that the biggest challenge regarding water is to make the city use it more efficiently. For this, greater investment in the water sector is needed.

Analyzing the links that are declared in the ISUDS, between water and other factors, we highlight that although most cities are points of interconnection with agrarian zones, only the city of Úbeda proposes a direct connection and tackles water in a holistic way regarding agriculture. However, the majority deals with the water-energy connection, although with the aim of solving a greater thermal comfort (hot water) using new energy sources that suppose an energy-saving and a lower emission of GHG. Only the Linares project addresses energy consumption within the integral water cycle. It also highlights the relationship between water and the environment that ISUDS collects, in its derivative of impact on health, which makes more sense with respect to TG6.

The project of the city of San Fernando explicitly considers water as one of the pillars of the city's culture, which we consider one of the most effective strategies to make water visible among citizens. All the plans link water and tourism because citizens clearly understand water as an economic asset of sustained development for the future of the city. In this line are the projects of Estepona, San Fernando, Puerto de Santa María, Motril, and Jérez de la Frontera.

In conclusion of our analysis of water-binding nexus with other factors, we can conclude that cities understand the pollution that agriculture produces on water sources, but not its mechanism to stop it. They do not quite understand the water-energy nexus, where the latter's reduction plans prevail even at the cost of increased water consumption. They do understand, however, the water-tourism-culture nexus.

If we analyze the WSC indexes that would allow us to monitor progress towards a new stage of "water sensitive city" we see that there would be some of them that, due to the ISUDS methodology, would always appear and, therefore, have not been included in the table as differentiating elements between the different cities. They are all the indexes of objective 1, index 2.3 and 2.5. We did not try to measure these indexes, as it would require a methodology with the development of workshops and

surveys among the main stakeholders of the city, but only to detect which indexes are present to be able to establish the basis, to carry out future field research, once all ISUDS have been executed.

Of the rest of the WSC indexes, we observed that the indexes that, if applied, would appear as measurements, would be indexes 2.1 and 2.2 that show the concern to advance towards a greater education of the citizens and a greater connection with water. Indexes 4.1, and 4.2 also stand out, and 4.3 which highlight a concern for greater efficiency in the use of water in the city. Objective 5 would also appear reflected with all its indexes as an aspiration to achieve a higher quality of life and health within the city. The massive appearance of indexes 7.1 "Diversify self-sufficient fit-for-purpose water supply" and 7.3. "Integration and intelligent control" denote a concern for achieving a complete water cycle with a greater intelligence of the infrastructures and water systems for the city, that is, a clear aspiration towards a "Water Smart City".

From the perspective of "Practices" that cities to evolve to a higher city stage, we see that the one that dominates the most is "Catchment", followed by "Ecosystem", with most cities addressing both areas jointly. Only three cities that address the three areas together to advance, which are Estepona, Linares, and Motril, stand out. The social contract most reflected in the awareness part of citizenship ("Water-conscious citizens") is a minority and appears linked to a holistic orientation or related to "Catchment".

In any case, to have an accurate diagnosis it would be convenient to wait for the execution of the ISUDS to conclude around 2020, to see the true effectiveness of these practices in their aspirations. This places most cities, positioning themselves with the expectation to achieve in an evolutionary stage of cities "Waterway cities" (stage 4), with the objective of environmental protection and water axis as a means of social connection, or even "Water Cycle cities" (stage 5), with the aim of having a comprehensive water cycle management [15]. However, they also appear in different areas of some of the cities, many of them impoverished neighborhoods, the stated objective of improving the drainage systems of the same, which comes to place the city in an evolving stage of 3 "Water Drained city". None of the cities have reached the stage of "Water Sensitive city".

Finally, in the analysis, the results that the cities hope to obtain in the ISUDS with respect to water have as a common denominator the possibility to conjugate sustainability and habitability, that is, make compatible the short-term welfare with the sustainability of the model in the medium and long term. On the other hand, we want to highlight the fact that one half of the cities have aspirations to obtain results in the four areas, which denotes a concern for the adaptation of the city to a changing environment regarding water ("Resilience") linked to of climate change and a greater interest in the economic implications of the efficient use of water ("Productivity") in relation to the sustained economic development of the city.

Taking into account all the results obtained, reflected in Tables 2 and 3, we found it interesting to make a ranking of the cities that positions them towards their aspiration for "Water Sensitive City". In order to elaborate this ranking, we considered that although the budget dedicated to actions around water is important, it is necessary to consider whether such expenditure is produced in a sealed, isolated way, or seeks the leverage effect with other factors. Thus, we gave priority to those cities with important actions that are aimed at the "Water conscious citizen" because they are the ones that allow us to advance in the hydrosocial contract of the citizenship, key for the city to be sustainable and move towards a new stage of "Water Sensitive City." Other decision factors were also considered, such as the number of areas where results are expected ("Outcomes"), the number of "Practices", and the number and importance of the nexus with other factors that consider the holistic vision of the sustainability. This is how the ranking was valued, from highest to lowest aspiration towards a "Water Sensitive City" model.

As a main conclusion, from the analysis of all the results obtained, we believe that it is necessary to move towards a greater development of the hydrosocial contract, through greater education of citizens in aspects related to water that make it more visible between it, and a greater connection (nexus) with other factors (energy, food) that allow global and connected actions to make the city more sustainable.

A greater deepening of this contract would have a positive impact on the evolution of the city towards the ideal of "Water Sensitive City". Likewise, greater investment in urban water actions is required in the sustainability plans of the cities, which are very low compared to other sectors.

We detected issues that we missed in the ISUDS and the possible points and recommended actions that would make it possible to bring the intermediary cities of Andalusia closer to the stage of "Water Sensitive City" [15] through further development of the hydrosocial contract. To achieve this, our recommendations would be:

1. A greater presence of water as a focus of the sustainable development plans of cities. We detected that the presence of water in the city's sustainability plans is not enough.

2. The technology and ICT solutions that could contribute to a greater city intelligence regarding water are not sufficiently represented, especially when the construction of the ISUDS makes it worthwhile for the cities to have or implement Smart City plans. The use of new ICT technologies for information and education of citizens regarding water could be a good tool, as well as a tool to reduce water consumption and more efficient water use.

3. A possible "water qualification" of buildings, in the image and likeness of their energy rating. In this way, the responsibility of households in the efficient use of water and visibility of the importance of it among citizens will be rewarded. In addition, an integral qualification, linking water and energy use, could be undertaken as an "intelligent building".

4. The ISUDS do not collect actions that treat together the clear relationship between the water-food nexus. It draws attention in an obviously agricultural region like Andalusia. There is a disconnection between the urban and agricultural character of these types of cities, as two totally separate spheres in the management of the city. Plans to reduce the pollution that agriculture can produce on surface waters or aquifers are needed. This should be complemented with citizen literacy about the water-food nexus and its impact on pollution.

5. The energy aspect of the impact of the integral treatment of water is not collected. The energy-water nexus is not visible in the plans. An energy budget of water treatment is needed to quantify its impact on GHG production and put in practice plans to reduce it.

6. There is a lack of greater appreciation of water by citizens. Citizen education policies regarding the efficient use of water and its economic and environmental impact on the future of the city are key to achieving greater sustainable development of the same.

7. Heat waves, so typical in Andalusia due to its climate, are not treated with solutions based on the efficient and ecological use of water. "Integrated Urban Water Management, Green Infrastructure, and Water Urbanism" actions are required [5].

8. The possible increase in water consumption due to the increase in green areas declared as an objective in most ISUDS. Solutions should appear that consider this impact.

9. The possible increase in the consumption of hot water (sports and municipal facilities) due to greater thermal comfort due to energy savings achieved with new forms of sustainable energy (use of solar panels) has not been taken into account. The holistic and linking vision between water and energy is required.

10. Many of the water treatment plants are on the verge of over-accumulation. Although they are not within the scope of the ISUDS, they should declare the impact they could have on the sustainable development of the city. Investment in water infrastructure is required.

11. An improvement of the rainwater network is needed, with a possible differentiated treatment of the city's sanitation network. Investment in water infrastructure is required.

12. Improvement of soil permeability through sustainable urban drainage systems (SUDS), which increase the climatic comfort of the urban space and mitigate flooding.

13. There are residential vulnerability and poverty against floods in specific areas of the city.

14. Many of the cities declare that they have bad odors due to water, which indicates a need for improvement of the "sewage treatment plant" and the city's sanitation network. Investment in water infrastructure is required.

15. There is an increase in the costs of the water network due to the low densification of some cities, which complicates the sustainable economic development of the city's water infrastructure. There is a need for a clearer nexus between water-planning of the city, which implies a clearer "hydrosocial contract" with citizens.

16. Water remains invisible for some services that the citizens receive. It seems that water is only a problem of the water company, not the responsibility of the city. Coordinated plans between water utility companies and city politicians are needed.

17. Although in the ISUDS there are reflected measures for the criterion of sustainability of the urban metabolism (water consumption, energy, waste, CO2, air quality), there is no holistic approach to its management, connecting all the parameters.

18. Related to the previous point, the ISUDS suffer from a lack of integral focus on the impact that different economic sectors, key for the economic development of the city, may have in the struggle for the use of water. We are talking about the commitment that many cities will have to achieve in their policies of human needs, agriculture, tourism, energy, and environment for the distribution of water.

As future lines of research we propose to perform a comparative analysis in Andalusia with respect to the other two calls of the ISUDS, the second call in May 2017 and the third call in May 2018, to detect if there have been advances between calls on urban water, and to detect common patterns and links with other factors of urban development. The research can also be extended to other Autonomous Regions in Spain, to detect similarities and differences between geographical areas.

On the other hand, it would be interesting to use a numerical score for each WSC Index indicator on the winning plans, with the precise methodology [32,40]. This would require fieldwork with workshops, questionnaires, and face-to-face interviews with the city's stakeholders that evaluated said score. Regarding this step, we believe that it would be relevant to do it once the execution of the different ISUDS is completed, which, depending on the plans, end between 2020 and 2022. In this way, we could see the efficiency between what has been intended to be achieved (expressed in the ISUDS themselves) and what has been really executed.

The analysis could be completed by crossing the results of this research on the public behavior of citizens with respect to their private behavior in the use of water in homes. Private behavior would measure the social needs of citizens [41]; placing special emphasis on real habits of comfort and cleanliness [42]. This would give us a picture of the common patterns and coherences between these two spheres of the citizen, public and private [14]. To carry out such research, it would be necessary to count on the water company, which is the entity that interacts most directly and most frequently with citizens. It would be interesting to have "Smart meters" as a measuring tool and means of education on the efficient use of water in the home.

5. Conclusions

By way of conclusion, we would like to emphasize that none of the medium-sized cities in Andalusia that have received funds to develop ISUDS have reached the "Water Sensitive City" status. However, some of them have begun to implement projects and programs that bring them closer to that level, initiating a transition where water will play an important role in the sustainability of the city. We must wait to see how these plans are implemented to know their efficiency and conclude with an accurate diagnosis of the evolution of the hydrosocial contract and its nexus with the status of "Water Sensitive City". A subsequent evaluation of the stakeholders of the cities of the measures and results obtained would be interesting.

We want to send a positive message regarding the role of urban water because in many cities this has been considered from an "entire urban water cycle" approach with its integration in the design of solutions for the sustainable development of cities.

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Nomenclature

CBA	City Blueprint Approach
CRCWSC	Cooperative Research Centre for Water Sensitive Cities
ERDF	European Regional Development Fund
GDP	Gross Domestic Product
GHG	Greenhouse Gases
ICT	Information and Communication Technology
ISUDS	Integrated Sustainable Urban Development Strategy
IWA	International Water Association
NGO	Non-governmental organizations
NUS	New Urban Schedule
SDG	Sustainable Development Goals
SGOP	Sustainable Growth Operative Program
SIP	Strategy Implementation Plan
SOG	State Official Gazette
SUS	Spanish Urban Schedule
SUWM	Sustainable Urban Water Management
TG	Thematic Goals
UIN	Urban Initiatives Network
UN	United Nations
WHO	World Health Organization
WSC	Water Sensitive City
WSCI	Water Sensitive Cities Index

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