Analysis of water use patterns and conflicts in the Sa Pobla Plain and Alcudia Bay (Majorca, Spain)

Karim T., Von Igel W., Escobar Soler M., Candela L.

in

El Moujabber M. (ed.), Shatanawi M. (ed.), Trisorio-Liuzzi G. (ed.), Ouessar M. (ed.), Laureano P. (ed.), Rodríguez R. (ed.).
Water culture and water conflict in the Mediterranean area

Bari : CIHEAM
Options Méditerranéennes : Série A. Séminaires Méditerranéens; n. 83

2008
pages 131-142

Analysis of water use patterns and conflicts in the Sa Pobla Plain and Alcudia Bay (Majorca, Spain)

Tamoh Karim [1], Wan Von Igel [2], Maria Escobar Soler [1] and Candela Lucila [1]

[1] Dep of Geotechnical Engineering and Geoscience-Barcelona, Spain.
[2] Enviros-Barcelona, Spain

Summary. Majorca, the major island of the Balearic archipielago (Mediterranean sea) presents a very specific situation regarding water resources and water management. The uneven spatial and temporal rainfall distribution, in combination with the varying total population leads to important changes in regional and seasonal water availability. Moreover, as water demand from agriculture and tourism is concentrated during summer, the situation becomes more complex. A conflict regarding water rights and use between stakeholder groups has been present with varying intensity over time. The development of the conflict is related to the steady tourism growth, loss of natural ecosystems and decrease in agricultural activity along the past decades. Public participation in water management, although limited, is regulated by law. Less than a third of the Balearic Water Council representative's composition includes the agricultural water users, holders of water supply from municipalities, communities of water users and a representative of existing environmental groups.

Keywords. Water conflict - Water management - Water demand - Majorca.

Analyse des usages de l'eau et les conflits dans la plaine de Sa Pobla Plain et la Baie de Alcudia (Majorque, Espagne)

Résumé. *Majorque, l'île principale de l'archipel des Baléares, en Méditerranée, présente une situation spécifique quant à la ressource en eau et sa gestion. La distribution spatiale et temporelle inégale des précipitations, en plus d'une population fluctuante, conduisent à des changements importants de la disponibilité régionale et saisonnière de l'eau. Cette situation devient plus complexe pendant l'été en raison de la demande accrue en eau pour l'agriculture et le tourisme. Il s'en suit un conflit concernant les droits d'eau et son l'utilisation par les différents groupes d'utilisateurs - qui a eu une intensité variable au cours du temps. Le développement de ce conflit est lié à la croissance continue du tourisme, la détérioration d'écosystèmes naturels et la diminution de l'activité agricole durant les dernières décennies. La participation publique dans la gestion de l'eau, bien que limitée, est réglée conformément à la loi. Moins du tiers de la composition des représentants du Conseil de l"eau aux Baléares inclut les agriculteurs, les détenteurs d'approvisionnement en eau de municipalités, les communautés d'utilisateurs d'eau et un représentant des groupes environnementaux.*

Mots-clés. Conflit d'eau - Demande d'eau - Majorque.

I - Introduction

Conflict is omnipresent throughout the history of humanity where we constantly hear about community members or institutions confronting one and other, controversy between institutions or organizations and tensions between countries or large social groups of a country (Ormachea, 2001). Although this statement from Ormachea is very true, and that every lay man can observe and would easily agree with it, here we revise some definitions of the concept in order to have a better framework when analyzing a conflict.

A simple definition presented by Huggins when studying watershed management is that conflict 'is a situation where actors have *incompatible goals*' (Huggins, 2004), where goals include status, power and/or resources. According to this definition, conflict is manifested in purposeful behavior by the protagonists, in order to capture more of the scarce resources or to overcome the strategies of other protagonists.

An alternative framework makes the distinction between *disputes* and *conflicts* based on the differences in the nature of the goal identified by Mwagiru *et al*. (1998). They reserve the former term for situations where actors disagree about their interests and therefore a *dispute* is over a specific quantifiable need, a resource that is tangible and thus negotiable. A *conflict* is something qualitatively different, arising from disagreements over values. Values include perceptions of rights, of which cannot be negotiated. 'The important difference between a conflict and a dispute, according to authors supporting this view, is that while a dispute can be settled through arbitration or through court processes, conflicts can only be resolved by a change to perceived underlying injustices or inequalities' (Huggins, 2004).

CEMDA (2005) defines conflict as 'an interactional process between two or more parties concerning one or more issues, which is born, growths, develops and can transform, disappear and/or dissolve, and sometimes stay relatively stationary' putting much more emphasis on the dynamic characteristic of conflicts.

Analysts have noted that the Chinese character for 'conflict' has 2 symbols – one for danger and one for opportunity (Slim, 1996). There are authors who also remind us that "Great accomplishments can occur at a time of great change (Kitay, 1998).

In order to evaluate existing conflict of interests in the water domain an analysis was carried out in the Majorca Island (Spain) in order to propose actions to solve existing water management problems.

II - Methodology

This study is based on the existing technical documents produced by the Water Agency of the Balearic Islands as well as local press, and complemented with a social research consisting of extended interviews with several stakeholders from different interest groups, which were carried out between April and May 2004.

Interviewed stakeholders were identified through a stakeholder analysis and by recommendation of the primarily identified stakeholders which were specifically asked to do so. After a brief introduction to the overall objectives of the MEDIS project, the interviewed stakeholders were initially asked to explain their involvement in the water resources management in the area. Each interview extended over 30 to 90 min and followed a general structure in order to allow for flexibility and adjustment to the concerns of each stakeholder. Only some topics were previously prepared in order cover important issues. Some of the main topics addressed were aimed at eliciting their values and criteria to evaluate possible water management actions to solve the problems expressed by them and other people.

The results are obtained from the conclusions driven from these interviews, together with those from a previous study of similar characteristics commissioned by the Balearic Island Water Agency to GEA21 (Barón, 2001) and considering the knowledge gained from three years studying the water management in the area.

III - Description of the area

1. Main characteristics

The zone of the Alcudia Bay and the Sa Pobla plain are located in the northern part of Majorca (**Fig. 1**). Considering the municipal districts of Alcudia, Buger, Campanet, Llubi, Muro, Sa Pobla and Santa Margalida, the total area is 314 km^2, which corresponds to 8,6 % of the Majorca island (**Tab. 1**). The population of the area is of 45.539 inhabitants, 97 % living in urban centers which vary between small villages to a maximum of 13000 inhabitants (Alcudia) (IBAE, 2005). The mean

floating (tourism) population is estimated to be approximately 35.000 people. During the last 50 years there has been a population growth of 53 %, accelerating in the last decade to a rate of 33 %. This is, nevertheless, a smaller population growth than the mean of Majorca (Barón, 2001).

The main economic activities of the area are related to the agricultural and the tourism sector. The agricultural activity takes place in all the municipal districts although with varying intensity (Sa Pobla is the most important), whereas the tourism activity is more important in Alcudia, Muro and Santa Margalida. More detailed information on the study area can be read in Donta *et al*. (2005).

Table 1. Main characteristics of the Alcudia bay and Sa Pobla plain.

The territory	314 km^2 (8,6% of total Majorca)
	7 municipal districts
Population	45.539 inhabitants
	Approx. 80000 equivalent inhabitants
	97 % living in urban centers
	In the last 10 years population increase of 33%
Tourism sector	185 tourism establishments (with total of 34643 beds)
	Approx. 16 % of beds of Majorca
Agricultural sector	78% of the surface is classified as agricultural land use
	52% of the surface is actually used agricultural land
	Approx 3700 ha of irrigated land (27% of irrigated land in Majorca)
	Potatoes, fodder and fruit trees are the main crops
	Irrigation systems: 81% aspersion and 19% localized irrigation
S'Albufera National Park	1700 ha
	Included in RAMSAR, ASPB (Directive 79/409/CE) and Eurosite

(Source: INE, 1999; IBAE, 2005; DGRH, 2001).

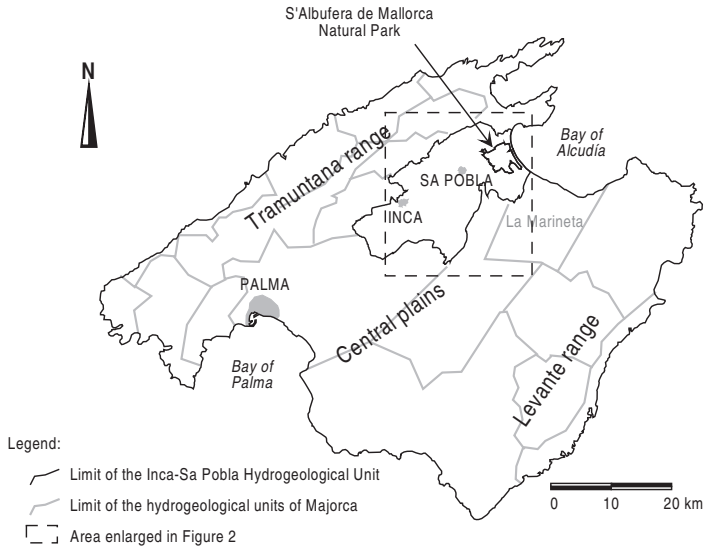

Figure 1. Location of the study area.

2. Socio-economic activities

The Alcudia Bay forms the biggest bay of the island having sandy beaches stretching along nearly 20 km. An important tourism industry has developed over the past decades centered on two major coastal towns, Alcudia and Can Picafort. In this area there are at present 185 tourism establishments with a total capacity of 35.000 beds in hotels and apartments, representing 12 % of the total of Majorca (**Tab. 1**).

The Sa Pobla plain, found to the south of Alcudia bay, has long been a traditional agricultural zone growing vegetables, fruit trees and fodder. Agriculture is not only of social and environmental importance in the area, but it is also of economic importance. In Sa Pobla, agriculture represents the main activity around which the local economy is based.

The irrigated surface in the area was estimated to be 3717 ha (57 % in the Sa Pobla municipal district) by the National Agricultural Survey of 1999 (INE, 1999). This represents 27 % of the total irrigated land of Majorca. The main irrigated crops are herbaceous (86 %). The most important irrigated crop is the early- and mid-season potato grown for export, which occupies nearly 30 % of the irrigated area. A constant decrease in the irrigated area nevertheless, can be observed since the mid 1980's (von Igel, 2004).

The S'Albufera National Park, created in 1988, is located to the north of the studied area and occupies over 1700 ha in the municipal districts of Alcúdia, Sa Pobla, Muro and Santa Margalida. This wetland is important for its biodiversity, best known for its endemic and migrating birdlife, and protected by several international agreements (RAMSAR list, ASPB and Eurosite) (TAIB, 2005). Environmental groups have taken special care to preserve this wetland. Although the tourism business related to the National Park is not significant compared to the beach related tourism, it is important because it takes place during the low-season.

IV - Water uses in the Sa Pobla Plain and Alcudia Bay

1. Water use for drinking water supply

The estimates of total water extraction for municipal drinking water supply in the area vary between 7,3 Mm^3/year (Govern de Les Illes Balears, 1999), 8,4 Mm^3/year (Barón, 2001) and 11 Mm^3/year (Perelló, 2002). The source of water is the Inca-Sa Pobla Hydrogeological Unit. On top of the aforementioned uses, there are also groundwater extractions derived outside the area for municipal water supply in the Pollença Bay (2 Mm^3/year) and Palma Bay (2,5 Mm^3/year).

More than 50 % of the municipal water uses correspond to activities related to tourism, and therefore most of the groundwater extraction occurs during the summer season. This would imply a mean of 560 l/person if only the resident population was accounted for, and 307 l/person considering the equivalent mean tourism population (Barón, 2001).

An audit fulfilled for the Water Administration (Eptisa, 2000) indicates that the highest per-person-consumption correspond to the tourism zones, which double the per-person-consumption in urban areas of local inhabitants. Gardening uses as well as leisure and sport facilities, and scarce implementation of water-saving procedures and water-reuse techniques are the main causes of this excessive use according to this study.

2. Water use for irrigated agriculture

The estimates of water extraction for irrigated agriculture vary between 21 Mm^3/year (Barón and GEA21, 2001), 25 Mm^3/year (Perelló, 2002) and 30 Mm^3/year (Govern de Les Illes Balears, 1999). Average per-hectare-consumption in the area is estimated to be approximately 6000 m^3/ha/year.

The pattern of present water use for irrigation is dominated by the fact that the main irrigated crop corresponds to the early- and mid-season potato. This crop grown during winter and early spring and is harvested in April and May and therefore water demand takes place between December and May. Seemingly this would reduce the water demand of the crop, but considerably varying amounts are used depending on the climatic conditions to sprinkle water in order to avoid freezing. In the past, during the summer farmers used the land to grow other crops (vegetables) as well, but these crops have turned non-profitable.

The present timely pattern of water use for irrigation reduces the competition for water in the summer season as the demand for water in irrigation is distributed more evenly along the year.

3. Water use for environmental preservation

Perelló (2002) makes a rough estimate of the flow needed to maintain the ecological status of the S'Albufera wetland calculating some 25 Mm^3/year. Sources of water to the wetland are perennial spring discharges from the Inca-Sa Pobla Hydrogeological unit, surface runoff after rainfall events coming in through two creeks, sporadic discharges of the karstic spring of Ses Ufanes flowing into the wetland and discharges of the wastewater treatment plant of Sa Pobla and Muro flowing in through the two creeks.

The Hydrological Plan (Govern de Les Illes Balears, 1999) indicates that approximately 30 Mm^3/year groundwater discharge is necessary to avoid seawater intrusion and to maintain ecologic flow to the wetland.

V - Nature of the conflict

Conflict is about the use and allocation of scarce water resources in the Inca-Sa Pobla plains. Traditional agriculture and new growing tourism business are the major sectors extracting groundwater resources. Overexploitation causes saline intrusion and agriculture nitrate pollution. Deteriorated quality restricts even further the usable water resources. It also induces important pressure over the quantitative and chemical status of the wetland that interacts with groundwater and surface water. In summary this situation confronts the tourism business, agricultural sector, environmentalists and the water administration in different ways.

The geographical distribution of the resource within the Inca-Sa Pobla Hydrogeological Unit is relevant for the conflict. Important groundwater resources are available inland, in the Sa Pobla plain, whereas extraction of groundwater near the coastline at the Bay of Alcudia is restricted due to seawater intrusion. Minor resources are karst springs in the hill-foot that drains towards the plain and eventually to the wetland. Surface water resources are only available during short periods after intense rainfall events in flash-flood type of regime and are therefore not exploited. They are nevertheless significant resources for the wetland.

Temporal distribution of the resources is also relevant to the conflict. Recharge of the groundwater reservoir occurs during the rainy periods in autumn and spring. Whereas the major extractions/uses occur during summertime producing a temporal disequilibria between the availability and the demand. The groundwater resources have the peculiarity of buffering to some extent this seasonal variations, but inter-annual dry periods put excessive stress on the reservoir inducing irreversible damage to the resources (saltwater intrusion) and socio-economic impacts (bad quality of water supply services in quantity and quality).

Therefore the level of conflict over time is directly correlated with the climatic conditions intensifying with long dry periods and relaxing during wet periods. Water resources frequently becomes also a subject of political election periods specially at municipal level, but also during regional (The regional elections of 2003 opposed two different development models including opposed water policies – see below) and national elections (An important divergence in the political programs

of the two main parties during the elections in 2004 was regarding the national water policy). Isolated hydraulic projects have also had influence on the evolution of the conflict (as will be explained later).

The main disagreements between the interest groups have their origin in ethical values given to water ownership and to traditional water uses, as well as to economic interests. Disagreement also exists regarding the responsibilities and extends of environmental deterioration and on the responsibilities of remediation actions. Technical aspects over which there are disagreements include the extend to which each party is responsible for the deterioration of the quality of water and the actions that need to be taken for the remediation. Disagreement over socio-economic aspects includes the repartition of costs to develop and operate new water sources.

Agreement among interest groups exists regarding the fact that to maintain agriculture is necessary for the management of the hinterland and the scenery. This is simultaneously of benefit to the tourism business and the social values of the right to maintain a traditional activity. Many representatives (not all) of the tourism business agree with the agricultural sector on mutual benefits of maintaining agricultural activity since it produces fresh food supplies for the tourism industry. There is also agreement on the benefit to maintain a sound wetland. This does not only benefit the interests of the environmentalists, but also of the tourism business as a sound wetland attracts tourism.

The causes of conflict can be classified as proximate or structural causes. Proximate causes (also known as triggers) are sudden changes which act as catalysts. Structural causes, usually less visible and less directly linked are underlying phenomena (of a political, socio-economic, cultural or other nature) that create an enabling environment for conflict to occur (Huggins, 2004). Proximate causes that have lead to manifest, explicit conflict in the last decade include:

1. Inter-annual dry periods

Climatic conditions of Majorca have as pattern recurrent cycles of two to four dry years. During these periods smaller recharge rates and sustained (or even incresed) groundwater extraction rates have induced bad quality in the municipal water supply (salinity, shortages) increasing the animosity between the tourism business and the agriculture and the local inhabitants as reflected by increasingly bad communication patterns.

Water transfer from the Franja de Llubí-Muro wellfield to the Palma Bay region for municipal water supply

In 1992 the *Govern de Les Illes Balears*/Regional Government, backed by the water supply company of Palma de Majorca (EMAYA), proposed a project to transfer groundwater resources from the so-called *Franja Llubí-Muro*, to the municipal water supply of the Palma Bay region (**Fig. 2**). The project rose social unrest among farmers and civil society of the source region, especially within Llubí. General animosity towards the government authorities and the tourism business was observed as locals had the feeling the project restricted their future development opportunities enlarging even more the gap between the developed coastal zones and the less developed interior zones. Technical reasons against the project were locally highlighted in order to raise the consciousness among local authorities and population on the environmental impacts (seawater intrusion) that could take place as a consequence of high pumping rates. Due to local rejection of the project, a technical commission composed of representatives of the local population, local authorities and the regional government was set up. The commission culminated three months later with the establishment of a strict extraction plan including a monitoring program of the impacts on the surrounding water resources. In the first couple of years of operation however, tension arose again when government authorities did not respect the terms of the negotiation continuing pumping below agreed minimum groundwater levels. Civil society and farmers reacted organizing a demonstration. Although initially there was a lot of distrust

among the local population towards the operation of the wellfield by the government, eventually the conflict has decreased as the authorities have respected the terms of the negotiation and no negative impacts have been reported so far.

2. Exploitation of the Ses Ufanes spring

Ses Ufanes is a sporadic spring that discharges big flows during short periods of time (2-3 days) only after big long-lasting precipitation events. This water flows into the San Miquel torrent and to the S'Albufera de Mallorca Natural Park. In 1999 the private water supply company of Alcudia (ACASA) proposed to exploit this water resource drilling wells into the aquifer near the spring. This project found opposition especially among the population of the nearby town of Campanet and environmental NGO's, as they perceived the uniqueness of the spring and its natural interest were in danger. Farmers of the Sa Pobla plain were also against this project as they believe recharge of the Sa Pobla plain aquifer will be negatively affected by any exploitation of this spring. The conflict was manifest with the creation of a civil platform to protect the natural state of the spring formed mainly by young inhabitants of Campanet. Eventually the regional government declared the Ses Ufanes spring and the nearby area as a National Monument explicitly forbidding any exploitation of the water resources and therefore conflict decreased. In 2002 the regional government promoted a project to divert part of the resource of the naturally discharged water to an artificial groundwater recharge project ultimately designed to augment the water supply of Alcudia. Again opposition to the project arose. With the change in government (2003), the project was halted and conflict decreased again. The level of conflict is currently very low since no project to exploit the spring is discussed nor foreseen. Furthermore, recently (2005) the government has bought the property where the springs are located. It can be foreseen, nevertheless, that conflict level may rise again in the future as different interest groups have diverse ideas on how to manage and use this resource.

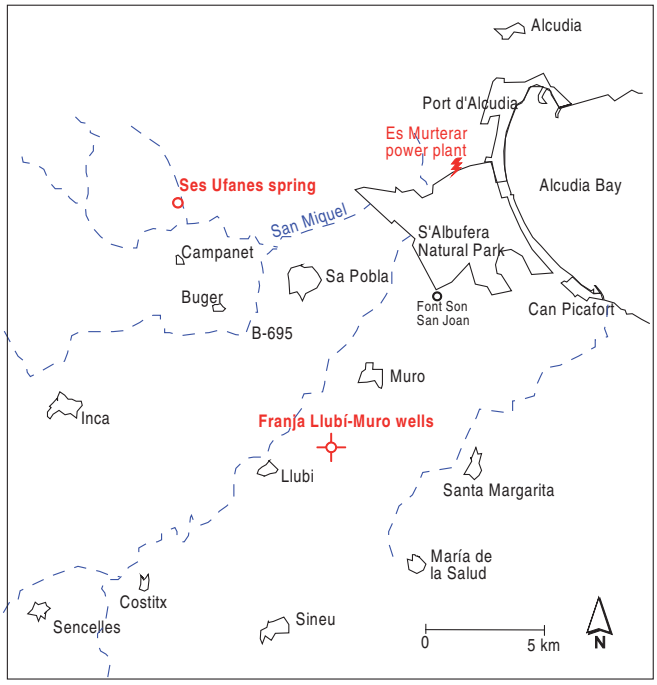

Figure 2. Study area with location of water points over which there have been conflicts.

Structural Causes that create an enabling environment for conflict to occur include:

(i) Not too accurate knowledge of the system dynamics as a consequence of a complex geological setting and too little investigations. This creates a disagreement and uncertainty about the causes of deterioration of and consequences of actions over the system;

(ii) The Spanish Water Law of 1985 introduced a change in the legal regime regarding groundwater ownership. As a consequence there is a situation that can be considered of chaos regarding the administrative control of extractions (Llamas, 2003; Martínez and Hernández-Mora, 2003 and Sanchez, 2003). It is widely accepted that there are plenty of illegal wells (11.000 legal and 23000 under administrative control, (Rodríguez, 2004, pers. comm.)) and total extractions from wells are unknown. This situation fosters a behavior were private interests are pursued (and achieved by those with the larger political and/or economical power) without regulation and in detriment of general public interests.

Conflict may be nested within a larger conflict in terms of the geographical or conceptual scope (Huggins, 2004). In the Balearic Islands there is an ongoing conflict over the development model to be followed in future that is latent across the society and manifest between political parties. The opposed models defend a liberal development model of high economic growth based on the development of the tourism industry promoting development of public infrastructures accompanied by a water policy of water supply increased via desalination, whereas the other model defends a development model of slow economic growth based on the slowing down of the development of the tourism industry and promotion of the primary and secondary sectors accompanied by a water policy of water supply increased through artificial recharge accompanied by demand management and re-use of water.

The first symptoms of conflict in the area started/arose during the construction of the Ses Murtera power plant. This project triggered activism among the environmentalists interested in protecting the wetland suffering increasing pressure over its ecological status from reduced water quantity and quality. Creation of the S'Albufera Natural Park in 1988 decreased conflict level.

The overall development of the conflict can be related to the steady growth in tourism and steady decrease in agricultural activity along the past decades. It has been observed that some people have the feeling of growing socioeconomic injustice produced by the gap in social welfare between the developed coastal zones and the less developed interior zones. Water resources have not been an underlying cause for this economic development. Discussions on water policies nevertheless, have been a floor to denounce this social problem. The specific water development projects mentioned previously under the proximate causes have marked explicit peak conflict levels during the last decades in the area. Their wide coverage in the media has raised the overall awareness rendering water resources a sensible subject in the regional politics.

VI. Actors involved in the conflict

In **Table 2** the actors identified that are involved in the conflict are presented. They have been classified into 6 different groups: public agencies, agricultural sector, tourism sector and golf-courses, water supply companies, city councils and other stakeholders.

Depicted fragments of the interviews are shown to indicate the different opinions that are held by the different stakeholders. They are also characterized in terms of their involvement in the conflict. Although this classification may vary with the evolution of the conflict in time, a general perspective can be made to group them into primary, secondary and external stakeholders. Primary types of actors are the groups identified by themselves and others as "owning" the conflict, those with the greatest influence and interest in the conflict. Secondary types of actors are those not directly involved but indirectly affected by the conflict, or indirectly influencing the primary actors. External actors are those with an interest in the outcome.

Acknowledgements

This study is part of a broad research project (*MELIA, Project No EVK1-CT-2001-0009),* financed by the European Union.

Table 2. Description of stakeholders with interests in the water management of the Sa Pobla plain and in the Alcudia Bay.

Stakeholder	Type	Depicted comments for interviews
Public agencies		
DGRH (Directorate General of Water Resources)	1	Cost recovery levels are very low in municipal supply and high in agriculture (although no externalities are paid)
IBAEN (Balearic Institut for Water and Energy)	1	There is a lack of coordination between the institutions that influence the water management.
IBASAN (Balearic Institute for Sanitation)	1	The agricultural sector is not ready yet to accept the good quality of treated wastewater for irrigation. City Councils do not look after fulfillment of regulations regarding the substances allowed in the urban sewage system.
Parc Natural S'Albufera de Mallorca	1	Nitrate contamination of aquifers and accidents at wastewater treatment plants deteriorate incoming water quality. There is no control over the incoming quantity of water, especially from the San Joan spring used for municipal water supply.
IGME (Spanish Mining and Geological Survey)	3	In some places there have been discharges from wastewater treatment plants causing nitrate contamination. Quality of treated wastewater needs to be improved to foster its reutilization without risk of harm. Bulk water supply should be a public service to avoid abuses and improve equity in the access to resources.
Consellería de Agricultura (Regional Ministry of Agriculture)	2	Development of deep wells by water supply companies has had affections on wells of farmers.
Agricultural sector		
Unió de Pagesos de Mallorca (Farmers Union)	1	If you give to the farmer treated water which is in good condition, no problem! Farmers pay or their water extraction and therefore use it carefully.
S'Esplet (Farmers Cooperative)	1	There is no agreement about data over agriculture (especially problematic is the part-time and retired farmers). Water uses in agriculture are overestimated and it's new cottages who are using an important portion The farmer has the feeling hotel owners have enough money to desalinate and that farmers used the water much earlier
S'Esplet (Farmers Cooperative)	1	There is no agreement about data over agriculture (especially problematic is the part-time and retired farmers). Water uses in agriculture are overestimated and it's new cottages who are using an important portion The farmer has the feeling hotel owners have enough money to desalinate and that farmers used the water much earlier

Stakeholder	Type	Depicted comments for interviews
Illacamp (Farmers Cooperative)	1	Nitrate contamination origins from agriculture and discharges from deficient wastewater treatment plants. Water supply for tourism should be considered an industrial use when defining priority of uses Farmers insist in their "traditional" agricultural practices despite the technical recommendations. There is no collaboration among farmers nor technical staff to exchange experiences and strengthen the common know-how
Finca Agrícola Experimental Sa Canova (Experimental Farm)	3	At present efficiency in water use is bigger in agriculture than in municipal water supply. The conflict between farmer and hotel-owners is a too politically driven social conflict. Are water supply companies interested in reducing the demand?
Tourism sector and golf-courses		
Asociación Hotelera de Platja de Muro (Association of Hotel owners)	1	No interview possible
Asociación Hotelera de Can Picafort (Association of Hotel owners)	1	Population and second residencies have grown much more than hotel facilities. Wastewater treatment is insufficient in the area and affects seawater. Tourism industry is not consulted nor informed by authorities regarding the water management Agricultural sector does not provide the services they need
Asociación Hotelera de Alcudia (Association of Hotel owners)	1	There should be a regulated price for water supply: the present situation gives rise to monopoly and speculation. The agriculture subsists mainly because of the tourism industry. Water is for everybody, but when it is scarce it should be allocated to the most profitable uses.
Asociación de Empresarios de Campos de Golf (Association of Golf Businesmann)	2	Law obliges to irrigate golf-courses w/ treated wastewater but it does not foresee a minimum quality guarantee for the supply
Asociación Hotelera de Alcudia (Association of Hotel owners)	1	There should be a regulated price for water supply: the present situation gives rise to monopoly and speculation. The agriculture subsists mainly because of the tourism industry. Water is for everybody, but when it is scarce it should be allocated to the most profitable uses.
Asociación de Empresarios de Campos de Golf (Association of Golf Businesmann)	2	Law obliges to irrigate golf-courses w/ treated wastewater but it does not foresee a minimum quality guarantee for the supply
Water supply companies		
EMAYA (Municipal water company of Palma)	2	Proliferation of illegal wells has important consequences over water resources.
Calviá 2000 (Municipal water company of Calvia)	2	
ACASA (Private water company of Alcudia)	1	Farmers believe they own the water. The Regional Government has seen that bulk water distribution is a good business and they want to take over this service.

Stakeholder	Type	Depicted comments for interviews
Font Son Sant Joan (Private water company of Can Picafort)	1	No interview possible
NGO's		
GOB	1	Water scarcity is induced by bad management rather than scarce rainfall. Treated wastewater from three plants enters the wetland (one is within its limits) and they have responsibility for the bad water quality.
Amics de la Terra	1	No interview possible
City Council		
Alcudia	1	Municipal water services should pay a unified price over Majorca for the bulk water supply.
Búger	1	Sanitary authority is not flexible enough with water quality issues as they are suffering from nitrate contamination.
Campanet	1	Hotels and agriculture should make more efforts on water savings
Llubí	1	People have the feeling benefits stay with hotel-owners and those who "give away" the water don't get benefits
Muro	1	No interview possible
Sa Pobla	1	The aquifer has been overexploited, basically by ACASA, who exploits within the municipal district, which has caused salinization. We understand the public nature of water, but we feel the water below our fields should not be exploited and transferred to other uses outside the zone. Even if agriculture is not profitable, it should be subsidized because it creates attractive landscape
Other stakeholders		
Geologist	2	Water supply companies in the area are responsible for saltwater intrusion as they have pumped excessive volumes during summer peaks. The CAP of the EC has negative effects over agricultural practices. There is lacking resources for the Water Administration and no political will to implement existing requirements
Businesman	2	Big hidden interests influence water policy. Salinization is also due to wells connecting aquifers as a consequence of bad legislation and lacking regulation about well construction
University Professor	2	There is no political will to manage the nitrate contamination of agricultural origin. Agriculture has a special, favored treatment. An agency grouping together all institutions dealing with water should be created that should be in charge of the bulk water supply. Pricing Commissions for municipal water supply should be changed to avoid abuses of supply companies.

References

Barón, A and GEA., 2001. *Análisis de los conflictos de intereses entre los distintos usuarios de agua en zonas piloto*. Dirección General de Recursos Hídricos. Govern de les Illes Balears.

CEMDA-Centro Mexicano de Derecho Ambiental, no date. *Resolución Alternativa de Conflictos en ANPS. Identificación y Caracterización de conflictos en areas prioritarias para la conservación.* Retrieved in March 2005 from http://www.cemda.org.mx/infoarnap/instrumentos/nuevosinst1.html

Donta A., Lange M., Herrmann A., 2005. Water on Mediterranean Islands: *Current conditions and prospects for sustainable management*. Centre for Environmental Research (CER), University of Muenster, Mendelstr. 516 pp.

EPTISA., 2000. *Programa de Gestión Integral del Agua (GIA en las Islas Baleares).* Govern Balear.

Govern de Les Illes Balears., 1999. *Plan Hidrologico de las Islas Baleares.* Consellería de Medi Ambient. Govern de Les Illes Balears..

Huggins, C., 2004. *Managing Watersheds, Managing Conflict*. In: 4th Regional Session of the Global Biodiversity Forum (GBF) for Africa, Tanzania 9-11 June 2004. Retrieved in March 2005 from http://www.gbf.ch/Session_Administration/upload/huggins_agriculture.doc

IBAE-Institut Balear de Estadisticas., 2005. *Fitxes Municipales*. Retrieved in March 2005 from http://www.caib.es/ibae/fitxes/mmallorca.htm

INE-Instituto Nacional de Estadísticas., 1999. Censo Agrario. Retrieved in March 2005 from http://www.ine.es/inebase/menu6_agr.htm

Kitay, M., 1998. Land Tenure Issues in Post Conflcit Countries. In: *International Conference on Land Tenure in the developing World*, University of Capetown, January 1998.

Llamas, R.M., 2003. Lessons Learnt from the Impact of the neglected Role of Groundwater in Spain's Water Policy". In: *Water Resources Perspectives: Evaluation, Management and Policy*, Al Sharhan and Wood (eds.). Elsevier Science, Amsterdam, pp. 63-81.

Martínez, L. and Hernández-Mora, N. 2003. The Role of Groundwater in Spain's Water policy. *Water International.*, 28: 313-320.

Mwagiru, M. Munene, M. and Karuru, N., 1998. *Understanding Conflict and its Management.* Centre for Conflict Research, Nairobi.

Ormachea, I., 2001. Resolución de conflictos ambientales: nueva perspectiva para el análisis y solución de conflictos. In: *Derecho y Ambiente: nuevas aproximaciones y estimativas* (Pierre Foy ed.). Pontificia Universidad Católica del Perú. Lima. Pp 163-177.

Perelló, D., 2002. La gestión integral del recurso agua en la unidad Llano de Inca-Sa Pobla como única alternativa de futuro para la Albufera. In: *Symposium on Intensive Use of Groundwater (SINEX),* Valencia 2002. Fundación Marcelino Botín/IGME.

Sanchez, A., 2003. Evolución reciente y previsible de la legislación sobre agaus subterráneas. Incidencia sobre los usuarios. In: *Jornadas Las Comunidades de Usuarios de Aguas Subterráneas y el marco normative actual*, El Prat del Llobregat, 8, 9 and 10 of may 2003. Comuniudad de Usuarios de Agua del Delta del río Llobregat.

Slim, H., 1996. *Planning between Danger and Opportunity: NGO Situation Analysis in Conflict-Related Emergencies*, Centre for Development and Emergency Planning, Oxford Brookes University, UK.

TAIB-*The Albufera International Biodiversity Group*., 2005. web page visited in March 2005 http://www.mallorcaweb.net/salbufera/index.html

Von Igel, W., 2004. *Institutional Analysis of Water Management Practices. Majorca.* Report prepared for the contribution to the Deliverable 12 of the MEDIS-project (No EVK1-CT-2001-0009).