

Changing tourism patterns, capital accumulation, and urban water consumption in Mallorca, Spain: a sustainability fix?

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This paper presents interdisciplinary research based on in-depth, comparative analysis of water consumption and land use patterns over a range of urban-tourist forms in Mallorca. The changing tourism patterns towards residential and quality tourism are studied, on the basis that capital investment for capital accumulation and increasing gains are its main drivers. Social awareness about overcrowding and resource limitations has moved the regulatory planning framework toward allowing further urban sprawl, based on the alibi of quality tourism. The rhetoric of this framework represents a first sustainability fix, a fix that hides the higher water demand and climate change issues. The socio-metabolic dimension of this process is analyzed in relation to how it has resulted in an uneven socio-spatial urban landscape of water consumption. This urban-tourist landscape is vulnerable to changes in climate, because it is sustained by an excessive use of water. Water supply is a serious constraint which has been resolved through its commodification and supply privatization, which are considered as a second sustainability fix. This tourism development process worsens rather than solves the metabolic rift, resulting in the second contradiction of capital accumulation between the imperative of continual growth and finite natural resources.

Keywords: urban and tourist water use; residential tourism; social power; spatial fix; Mediterranean coast

1. Introduction

The Balearic Islands, and among them particularly Mallorca, are a paradigmatic example of tourism evolution and transformation with time. This paper illustrates the changing tourism patterns in Mallorca, and instead of adopting an economic and managerial perspective on the island's tourism development, growth and sustainability, this paper takes a critical stand by addressing the challenges exacerbated by tourist specialization. It understands this specialization as a strategic move towards a higher quality model with possible negative effects in terms of water resource sustainability. The paper examines the complex environmental, economic, and political relations, and their spatiality, from a Marxian-informed perspective, analyzing the interrelatedness of changing tourism patterns with crises in capitalism and changes in the regulatory planning framework. Residential tourism is a major component of this tourist specialization and of these complex relations. The concept of "residential tourism" has been used since the late 1970s to describe a development model based on the production of urban land for the construction

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of real estate property and second homes in tourist areas. Residential tourism generally refers to property ownership and short-term residence of North Europeans in tourist areas, residence that falls short of full migration (Mantecón, 2010; O'Reilly, 2007). In the built environment, residential tourism has blended with demographic and urban growth; hence, the term urban-tourist landscape is used in this paper to describe the outcome of this urban land development model.

This paper describes how changing tourism patterns and water consumption are interdependent factors in a “sustainability fix” that accommodates further growth in the tourism sector, but it is at the same time flawed by its associated higher water demand. The strategic move of mature destinations towards a higher quality tourism model and the proliferation of low-density urbanism with houses and second homes enjoying large numbers of water fixtures, together with gardens and swimming pools, has increased water consumption and exacerbated tensions between water supply and water demand (Deyà & Tirado, 2011; Essex, Kent, & Newnham, 2004; Gössling, Peeters, Hall, Ceron, Dubois, Lehmann, & Scott, 2012; Rico-Amoros, Olcina-Cantos, & Saurí, 2009). Water resource management issues are becoming more central to tourism management under future climate change scenarios of more pronounced annual and decadal variability in precipitation and reduced groundwater recharge (Iglesias, Garrote, Flores, & Moneo, 2007). The pivotal role of water for tourism sustainability, and the mismatch between water demand and water supply on Mallorca, has been discussed previously (Essex et al., 2004; Garcia & Servera, 2003; Kent, Newnham, & Essex, 2002). Empirical evidence on the magnitude of the additional water demand brought about by residential tourism specialization remains rare, and the paper elaborates on this issue. The relationship between urban land use patterns and water consumption are analyzed, including with respect to the spatial variation of the sensitivity of water consumption to variations in climate. It is hypothesized that the higher quality tourist model is associated with higher vulnerability to water scarcity induced by climate change.

1.1. Objectives and structure of the paper

The paper demonstrates the shortcomings of current shifts towards low-density/high-quality tourist construction from the perspective of sustainability, via the comparison of water consumption data and climatic sensitivity across differentiated urban-tourist landscapes. This involves presenting an empirical case study of the island of Mallorca. The paper's literature review and justification of the case study introduce the study's theoretical underpinnings by interpreting the changing tourism patterns as embedded in the space-economy of capitalism, with the complex economic and political relations and their spatiality expressed in relation to the tourist production of space. The environmental expression of these processes is, in territorial terms, less urban growth but more ex-urban sprawl, and in metabolic terms, also higher urban water consumption.

The paper examines whether the strategic move to tourism diversification and specialization through residential tourism can be understood as a first sustainability fix that enabled Mallorca's “third tourism boom” (Schmitt & Blázquez, 2003). It does this, first, by discussing the interrelatedness of changing tourism patterns and urban water consumption and by arguing that the sustainability fix embodied by residential tourism is flawed because of its higher water demand and climatic sensitivity. This aspect is explored empirically for the Mallorcan municipality of Calvià. Second, urban and regional planning is analyzed, showing that the democratic commitment to constrain urban growth has been outflanked by ex-urban, sprawling construction in the countryside and other urban

growth projects. The paper explores the issue that tourism specialization and residential tourism are providing specific solutions for the second contradiction of capitalism. This apparent solution is in reality contradictory. It is based on the alleged dematerialization of a technologized and tertiary economy, conveying the impression that service activities such as tourism are less energy- and material-intensive and are thus more sustainable. It does this by healing the metabolic rift (Foster, Clark, & York, 2010) that threatens growth due to the environmental constraints imposed by biophysical limits. Finally, it discusses if accelerating water demand, worsened in Mallorca by residential tourism, is increasing the market profitability of water supply through its commodification, leading to the privatization of water utilities and services. A second sustainability fix is understood, therefore, as the increase of water supply through desalination plants and groundwater overexploitation, despite the associated high energy demand and environmental impacts.

The concept of “sustainability fix” was originally framed in the field of urban politics and planning, and it refers to a political discourse that accommodates both profit-making and environmental concerns to safeguard growth trajectories in the wake of industrial capitalism’s downturn, ecological crisis and the rise of popular environmentalism (While, Jonas, & Gibbs, 2004). It is shown that the sustainability fix of a new form of tourism development (residential) is flawed given the associated higher water consumption, the power of the property market, the relaxation of planning controls and the privatization of the water providers.

1.2. Literature review

The trend of urban and socio-economic growth is particularly strong in the Spanish coastal areas and the Balearic Islands. According to Francisco Jurdao (1992, p. 85), the unbridled urban growth of the housing bubble is rooted in a tourism model of “growth without development”. He further states that the “Spanish tourism model has as a cohesive structure the search for financial gains of urban origin” (Jurdao, 1992, p. 83), where the developer has the support of the local political bosses and corrupt politics. It is suggested this also happens in the Canary Islands, through

the tougher restrictions on urban-tourism sprawl and expansion of bed stock in the new guidelines, powerful regional cliques have been able to consolidate their monopoly on tourism’s means of production through their lobbying and support for a model of sustainability based on ‘quality tourism’ [...] to expand tourism (albeit moderately) and sustain the accumulation of capital for the benefit of a minority of regional interests. (Bianchi, 2004, p. 517)

The material transformation in tourist areas that is related to real estate development is explicitly seen by some authors as a way in which residential tourism becomes a key element of socio-economic tourist modernization. Urban growth and demographic growth have been identified as the most significant expressions of tourist modernization in Spain (Mantecón, 2010). From a Marxian-informed perspective, the original driver of the proliferation of residential tourism and second home ownership is that they are being promoted as profitable targets for the absorption of surplus capital, which is what David Harvey (2003) defined as a spatiotemporal fix.

Urban growth is a major constant impulse of capitalism (Molotch, 1976), linked to capital’s fixation in the built environment (Harvey, 1978). Capital’s fixation seeks to gain exchange value, which is devaluated periodically as “one of the means immanent in capitalist production to check the fall of the rate of profit and hasten accumulation of capital-

value through formation of new capital” (Marx, 1894, Vol. III, chapter 15). This “creative destruction” is a spatial fix through which capitalism attempts to overcome cyclical crises of accumulation (Harvey, 2008). Harvey’s spatio-temporal fix has a double meaning:

A certain portion of the total capital is literally fixed in and on the land in some physical form for a relatively long period of time [. . .], on the other hand, it is a metaphor for a particular kind of solution to capitalist crises through temporal deferral and geographical expansion. (2003, p. 115)

The neoliberal agenda has re-launched growth perspectives through territorial “flexibilization” (Jessop, 1992, p. 55) in order to boost capital’s rate of gains through competitiveness.

Before exploring the role and function of urban growth related to real estate development and residential tourism, the Marxian-informed theoretical perspective on the changing tourism patterns in Mallorca has to be outlined briefly. Capitalism is accompanied by state regulatory institutional frameworks that can either promote capital accumulation or else constrain it to achieve more equity through income redistribution by taxation and public policies. Neoliberal capitalism implies deregulation, *laissez-faire* practices, and less state regulation. Neoliberalism has also shifted tourism models towards neo-Fordist practices (Ioannides & Debbage, 1997) and the adoption of neoliberal pro-growth strategies, taking profit through the alibi of quality tourism (Bianchi, 2004) as a sustainability fix so as to sustain capital accumulation.

The political role of hoteliers is important for the recent history of the Balearic Islands. The new neoliberal accumulation regime of financial capitalism (Arrighi, 1994) favors the Balearic hotel chains’ oligopoly applying strategies of: horizontal and vertical integration by absorbing other companies, new management modalities for the ownership and profitability of properties, e.g. the use of investment funds (real estate investment trusts) and venture capital, and attempts by bypass tax obligations through the use of subsidiaries to conduct financial transactions in tax havens (Ramon, 2002). Since the 1980s, the Balearic hotel chains have expanded their business internationally, fixing their capitals spatio-temporally. The hotel chain Barceló Corporación Empresarial, for example, started this internationalization in the Dominican Republic, where it created Bávaro as a tourist destination. Seventeen other hotel chains following this approach, including Matutes, Riu, Globalia, and Bahia Principe-Piñero Group (Murray, 2012). The relaxation of their pressure on the Balearic territory, as far as their capital investment secured more revenue abroad, coincided with the establishment of measures to contain the growth of tourism in the Balearic Islands. While this “Balearization” became global (Blázquez, Murray & Artigues, 2011) through the export of the Balearic Islands hotel model by its hotel chains corporations, the Balearics became attractive for residential tourism investment. Gabriel Cañellas, the first President of this autonomous community from 1983 to 1995, stated in 1991 in his inaugural Presidential that he supported quality tourism urban development, saying that “We want to convert the Balearic Islands into Europe’s second home destination” (Amer, 2006, p. 223). The notion of the “Balearic Islands for sale” (Seguí, 1998) bore fruit with the free movement of capital and people within the European economic space, with strong price differentials and an expansion of “black money” in tourism and real estate (Blázquez & Murray, 2010). The crisis of the Fordist capital accumulation regime (Lipietz, 1992) affected the Balearic Islands’ tourism, where the resorts were considered to have reached the maturity stage of the product life-cycle. Moving up-market to attract higher-income tourists was the consensus response (Morgan,

1991). The construction and services sectors have benefited from the spatio-temporal fix in the newly built environment through the densification of urban areas, ex-urban sprawl, and transport and events megaprojects like the enlargement of Palma airport and large scale entertainment areas. In addition, some local politicians were drawn into corruption networks to contribute to capitals' speculative revenues (Murray, Blázquez, & Amer, 2011). But, after the attacks of 11 September 2001, the "Arab Springs" since 2010, the growing travel costs to long distance air travel destinations, and the 2007–2008 financial crisis, the Balearic hotel chains increased their Balearic market dominance, coming to control 65.33% of the accommodation in the Balearic Islands (Murray, 2012, p. 1969).

Tourism can be understood as a hybrid economic formation that blends nature, institutions, and commodities. Gibson (2009, p. 529) suggests that "the 'trick' of tourism capitalism is its ability to commodify entire places and all they contain". Tourism development provides "solutions" for capitalism's so-called second contradiction, between the imperative of continual growth and finite natural resources. The current systemic crisis stresses the contradictions of capitalism, not only in economic but also in environmental terms, for instance related to climate change. The intrinsic contradictions of capital accumulation include: economic stagnation due to over-accumulation, growing social inequality, and limitations resulting from ecological degradation (Fletcher & Neves, 2012). Capitalism's contradiction with nature (Harvey, 1978) is characterized as external to capitalism, due to the barriers in nature, such as because of natural resources depletion or congestion costs that threaten its own profits and capacity to produce and accumulate more capital. Several assumptions provide relief to this second contradiction of capitalism, which can also be expressed by the metabolic gap between the need of capitalism to grow continuously and the finiteness of the biosphere and its capacity to provide humanity with natural resources (O'Connor, 1988). Without getting rid of the contradictions of accumulation, "capitalism is turning the environmental problems it creates into opportunities for further commodification and market expansion" (Igoe, Neves, & Brockington, 2010, p. 489). Capitalism, and tourism within it, seeks solutions to its own problems, which are mainly related to its infinite quest for growth and capital accumulation, but not to environmental problems (Magdoff & Foster, 2011). The sustainability fix, therefore, can involve adding residential tourism, despite its huge water costs, selling it as a remedy to the internal contradictions of capitalism, thanks to its elitist attraction and aesthetically pleasant appearance in terms of the urban landscape.

Urban water consumption and water supply can be among the major environmental problems associated with changing tourism patterns and urban growth. If residential tourism is understood as a sustainability fix to expand tourism and sustain capital accumulation, then the need to manage the increased water demand can be comprehended as a consequent sustainability fix. From a metabolic perspective, the demand for water appears inexorably to be rising, especially along the Mediterranean coast where high rates of population, urban and economic growth are observed. An increasing preference for suburban environments is observed, and more dispersed, low-density urban landscapes evolve. These landscapes are characterized by a spacious residential matrix of large plots occupied by gardens and swimming pools (Domene, Saurí, & Pares, 2005; Domene & Saurí, 2006; Parés, March, & Saurí, 2013; Vidal, Domene, & Saurí, 2010). As a consequence of these complex socio-economic developments, in most tourism-related coastal areas it is urban water demand and water supply that is the most dynamic sector for water resources management (Masjuan, March, Domene, & Saurí, 2008; Maestu & Gómez, 2010; March & Saurí, 2010). In these areas the privatization of traditionally public urban water management is already taking place (Romero Renau, 2006; Saurí, Olcina, & Rico, 2007),

and, while public and academic debates seem to lag behind, there is an urgent need to discuss how different underlying objectives (e.g. social equity, economic efficiency and environmental conservation) could be combined within a coherent implementation framework (Cabrera, Cabrera Rochera, & Cobacho, 2010). The strategic move towards residential tourism creates higher urban demand for water. These environmental problems are turned into opportunities for further commodification and market expansion through water supply privatization and an increasing reliance on non-conventional water resources, mainly sea and groundwater desalination. The Balearic island of Mallorca has been turned into a second home destination, and its development perfectly illustrates the changing tourism patterns and resulting challenges for sustainable tourism and sustainable water management. The next section describes and justifies Mallorca as an empirical case study.

1.3. Justification of the Mallorca case study

The Balearic Island of Mallorca is a major tourist destination within the Mediterranean, being a success story of mass tourist flows and of constant reinvention since the 1960s. In 2013, the Balearic archipelago received 12,992,755 tourists, with 72.8% going to Mallorca. The main origin countries are Germany (39%), United Kingdom (22.3%), and the rest of Spain (10.3%) (ATB, 2014). Behind the success of the Balearics is a singular regional planning story of urban growth regulation, which has resulted from geographical constraints – insularity and seasonality – and a social consensus against landscape deterioration and overcrowding (Rullan, 2011). This regulatory framework has added a new and appealing quality-based criterion, which allows for the persistence of the sun and beach tourist model and for a new residential tourism supply for a more selected market (Aguiló, Alegre, & Sard, 2005).

The more recent development of quality-based and residential tourism is related to shifts in European and international market economies which have helped to trigger and structure the Balearic transformation. The Balearic Islands have become a major target for real estate investment, this being accelerated after the Maastricht Treaty (1992) which established the European Union (EU), granted EU citizenship to member state citizens (by the Schengen Agreement in 1995), and introduced a central European banking system and a common currency (with the circulation of the euro in January 2001). The increasing growth in the value of households' financial and property assets also had a "wealth effect" among the population owning their own houses, who are the majority (87% in 2007) (López & Rodríguez, 2011, p. 10), with 32.54% of private houses have been financed through the mortgage market (Naredo, Carpintero, & Marcos, 2009). Further to this, between 1993 (after the Maastricht Treaty) and 2011 foreign investment into the Spanish real estate and construction sectors increased by 350% (reaching a maximum of 2.73 billion Euros in 2007), while in the Balearic Islands the increase was 1274% during the same period (involving 237.26 million Euros in 2011) (Datainvox, 2012). This development fuelled the so-called "third tourist boom" (Schmitt & Blázquez, 2003) that created additional growth as a complement to mass tourism resort development through the financial use of construction as financial assets for their anticipated returns as they rose in value in both urban and rural areas. The resulting proliferation of residential tourism has been marketed since the mid-1990s under the term "quality tourism", and it was actively encouraged by the public administration, mainly through regional planning, in order to reduce the tourism industry's seasonality. Residential tourism specialization is extreme in some coastal municipalities in Mallorca (such as Santanyí, Alcúdia and Andratx), where the proportion

of second homes rises to 60%, while vacancy rates have been reported as being as high as 88%, underscoring their function as investment for their exchange value rather than as housing objects for their use value (Hof & Blázquez, 2013; Vives Miró, 2011).

The residential and the mass tourism industry are both overcoming the current systemic crisis in the Balearic Islands through traditional and quality tourism improvements and growth. This is seen, for example, in the increasing movement of airport passengers there, with an 8.3% annual growth rate in 2011, with 30,946,651 passengers (AENA, 2013), which is higher than right before the crisis in 2007. Construction investment in regulated tourist dwelling capacity has also grown 66.5% between 2007 and 2011 (College of Architects of the Balearic Islands, 2012). In terms of urban densification, the dwelling capacity increased before the crisis by 13.3% between 2001 and 2008. The increase in bed capacity was 13.3% in the non-hotel sector compared to a 2.2% increase in hotel bed capacity, underscoring the move towards residential tourism (Murray, 2010). Finally, it can also be suggested that the Balearics are, within Spain, a region where the “housing bubble” has not been totally exploited, given that its house prices have decreased by only 17.38% since the crisis (2409.5 €/m² in 2008 to 1990.9 €/m² in 2011), maintaining the highest prices in Spain after only the Basque Country, Madrid and Catalonia (Ministerio de Fomento, 2012).

Even a decade ago some authors were discussing the pivotal role of water for tourism sustainability and the mismatch between water demand and water supply on Mallorca. Essex et al. (2004, p. 6) argued that “Over the next 25 years, many Mediterranean resorts will face the problems presently beginning to be addressed on Mallorca. Hence, the management of water resources will become central to strategies for sustainable tourism in Mediterranean resorts and environments”. There was discussion too of the implications for tourism-related water consumption of the shift from traditional hotel accommodation to residential and second home tourism development in Mallorca (Essex et al., 2004; Garcia & Servera, 2003; Kent et al., 2002). However, actual consumption patterns and the water sustainability challenges at a time of climate change are under-researched. Thus, an analysis of recent developments in Mallorca and their implications for urban water consumption offers lessons for other Mediterranean tourist islands, especially if a strategic move towards a higher quality tourist model is contemplated.

Tourist islands are particularly challenged by water resources management due to their geographical isolation and the impossibility of drawing on more distant or diverse aquifers. This insularity explains their dependence on natural renewable water resources (groundwater and surface water, including reservoirs) and increasingly their dependence on non-conventional water resources (sea and groundwater desalination, and treated wastewater). Environmental justice aims to analyze the inequity in the distribution of this essential resource, which can be worsened by tourism leading to social polarization, especially in water scarce environments (Cole, 2012; Gössling et al., 2012). An assessment of water management on the major Mediterranean Islands of Corsica, Crete, Cyprus, Mallorca and Sicily has pointed to the importance of a responsible awareness of the water usage of the agricultural, domestic, and tourism sectors in order to ensure sustainable water management in accordance with the European Union Water Framework Directive (Donta & Lange, 2008). In Mallorca, the per capita freshwater availability indicates a condition of absolute water scarcity. In comparison with these other islands, and due to a combination of high population density and high tourist demand, the severity of over-exploitation of water resources is high (Donta & Lange, 2008). The strategic move towards a higher quality tourist model has been made despite the fact that the island has to deal with crucial water shortages and with water scarcity. Producing successful

“quality tourism” and “tourist excellence” has involved a proliferation of the urbanization of nature and, in particular, of water. Residential tourism and growth, and golf tourism as luxury complements to the island’s mass tourist sector are dependent on constantly high and sufficient supplies of water (Essex et al., 2004). As a result, water uses in the urban sector have increased and diversified, accelerating demand and requiring that water management objectives are dynamically balanced between agriculture, industry and urban demands (Hof & Schmitt, 2011). The enhanced supply of water through new infrastructure (reservoirs) and desalination plants basically has been determined by the needs of the tourist areas, although urban and agricultural demands were also decisive. Consequently, relevant facets of destination management in Mallorca at a time of climate change include the questions of ecological and social sustainability.

The following analysis of land use patterns and water consumption exposes the spatially uneven production of urban water demand that is related to different and changing tourism patterns. In the face of climate change, the aesthetically pleasant quality tourist model which Mallorca is pioneering may pose an additional and serious threat to sustainable water management. Calvià municipality is introduced as case study that is particularly relevant because it is spearheading tourism upgrading on the island. The market and planning drivers of this land use change are finally analyzed, embedding the case study in a discussion of the complex environmental, economic, and political relations and their spatiality from a Marxian-informed perspective.

2. Materials and methods

The reasons for carrying out an empirical analysis in Calvià municipality and the methodological details of the socio-environmental analysis are explained next.

2.1. Case study of Calvià municipality

Located in the southwest of Mallorca Island, Calvià is a paradigmatic example through which to assess future tourism pathways, options, and challenges in the face of climate change and the limits to growth on the island (Figure 1). Calvià was also selected as a representative of Mediterranean Island tourism among the ten destinations chosen for the project “European Union Indicators for Sustainable Management at Destination Level”, a Europe-wide assessment of a system of sustainability indicators funded by the European



Figure 1. The Balearic Island of Mallorca and the six study areas that represent the range of urban-tourism forms from high-density mass tourism to second home residential tourism and all-year-round residential use.

Commission.¹ And in 1990 the municipality established “The Calvià Plan for Tourism Excellence” in conjunction with the Spanish Ministry for Tourism, reflecting how Calvià had started to concentrate on supplementing mass tourism with quality tourism and its higher expenditures.

Calvià’s innovative Local Agenda 21, which embraced sustainable tourism policies, won a number of international environmental awards and prizes. Its development objectives included limits to urban growth and a reduction of water consumption in the residential and tourism sector. Despite these sustainability aims, by 2000 Calvià was the municipality in the Balearic Islands with the highest proportion (62.6% or 11.36 km²) of its seafront (understood as the first 500 m) already developed (Murray, 2013). The Agenda 21 came alongside a municipal strategy which promoted more diversified tourism development, tourist specialization, and a new overall tourism model. As a result, 12% of the yacht berths and 25% of Mallorca’s golf courses are concentrated in the municipality. The municipality also has over 60% second homes, and it is characterized by an urbanized coastline with residential resorts, villas and low-density residential settlements around mass tourist centers (Hof & Schmitt, 2008). Calvià ranks among the Spanish Mediterranean tourist zones with the highest growth of a discontinuous, low-density urban fabric, the highest per capita water consumption levels, and the highest vulnerability to climate change (Saurí et al., 2011). Through residential tourism growth, the official residential population grew by 71.5% between 1994 and 2008, and per capita water consumption rose from 300 to 700 liters per person per day, exceeding the predicted demand (Murray, 2010). The role of burgeoning residential tourism in increasing urban water demand has eluded statistical observation, but it is untangled in the following empirical analysis linking tourism land use patterns to water consumption.

2.2. Comparative water consumption analysis

Water supply for tourism and the residential urban sector is usually accounted for together in Mallorca and most other Mediterranean tourist destinations. Therefore, the water demand of tourism and its different sub-sectors (hotels, second homes, facilities, activities, etc.) eludes statistical observation (Eurostats, 2009; Gössling et al., 2012). Water consumption data mask the spatial variability of water consumption that is related to urban and tourist land use patterns (Hof & Schmitt, 2011). One objective of the present analysis is to compare the share of quality and mass tourism within domestic water consumption levels on a per capita basis. Another objective is to compare land use patterns that account for the spatial variation in water consumption and climate sensitivity on a per capita basis. For this purpose, the relevant water consumption, land use, and population data were assembled for six case study areas representing archetypal examples across the range of urban-tourism forms (Figure 1).

Monthly water consumption data (2005–2007) for tourism and the residential urban sector were collected through fieldwork and written requests to water providers and Calvià municipality’s administration. The data exclude losses from the water supply network, and the water consumption of commercial users and golf courses. The raw data were aggregated at the spatial resolution of urban nuclei that are identical to sub-municipal census districts. No direct inference about water consumption at household or building block level could be made from these raw data. Therefore, the raw data on water consumption were analyzed by establishing a very detailed land use and population inventory at the parcel scale to derive per capita water consumption. Using a similar but less detailed approach, Rico-Amoros et al. (2009) studied the influences of tourism land use

patterns on water consumption in Benidorm and on the Alicante coast in Spain. The methodology of establishing a very detailed land use and population inventory for water consumption analysis on a per capita basis is briefly described (details are in Hof & Schmitt, 2011). In the next section, this comparative analysis is extended by analyzing water consumption's climate sensitivity.

The water consumption analysis focuses on the most accepted and tested determinants of indoor and outdoor water consumption. Irrigated gardens and swimming pools are the main determinants of outdoor water consumption, and calculation of indoor water consumption differentiates between tourist hotel and apartment beds as distinct from residential houses. The total water consumed indoors is calculated in detail as the sum of water consumed per tourist bed occupied in apartments, flats and single residential houses. To derive the relevant data, a land use database was built from digital cadaster data and on-screen digitizing of high resolution digital color orthophotos from 2006, with a geometric resolution of 50 cm/pixel (Dirección General de Catastro, 2010; IDEIB, 2010). Pool area, garden area, and built-up area (sealed surfaces and buildings) were mapped per parcel at 1:600 scale using the geographic information system ArcGIS™. For every parcel in the geodatabase, a record was made of the numbers of official tourist beds in hotels and apartments as listed by Calvià municipal government for 2007 (Ajuntament de Calvià, unpublished data), numbers of single houses and also of flats in multi-residential houses. This geodatabase structure and content allows for the calculation of relevant information on a monthly basis and also spatially. The relevant outdoor land uses (garden and pool area) were determined per parcel and for different tourist and residential housing types (Figure 2). Monthly water consumption was calculated per capita per day for the population of official residents and official tourists, taking the monthly percentage of open hotels and tourist apartments, and their capacity utilization into account (ATB, 2012).

To indicate the interrelatedness of land use patterns and water consumption, the monthly per capita water consumption values for each study area were converted into standardized z -scores based on the 2005–2007 mean and standard deviation of per capita water consumption in liters per person per day (l/p/d)². Likewise, the garden and pool area per capita were converted into standardized z -scores based on the 2007 mean and standard deviation. These outdoor leisure structures have a strong influence on the rising water consumption in the residential urban sector throughout the Mediterranean, creating

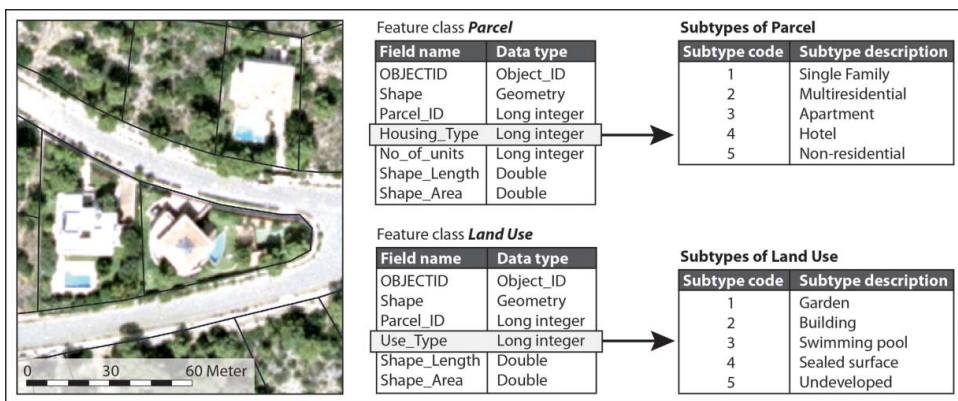


Figure 2. Geodatabase design for spatial per capita water consumption analysis. Orthophoto (year 2002, resolution 40 cm/pixel) reprinted with permission from Sitibsa S.A., Palma (Mallorca).

permanent water demands and additional consumption peaks in the season with low rainfall and high evapo-transpiration (Essex et al., 2004). The differences in water consumption are triggered by different land use patterns (Hof & Schmitt, 2011), and they translate directly into a sensitivity of water consumption to variations in climate (Balling & Cubaque, 2009).

2.3. Analyzing climate sensitivity of water consumption

In cases where individual single-family water consumption records are available, a direct relationship between the sensitivity of consumption to a change in temperature and precipitation can be established (Balling & Cubaque, 2009). The data available for the Mallorcan case study areas include water consumption in tourist accommodation to varying amounts. Therefore, a comparison of water consumption per area unit is not feasible. The variable component of monthly water consumption is caused by the strong seasonality of tourism. In order to account for this variable component of water consumption in the data for the individual sub-municipal district, per capita water consumption (l/p/d) is calculated for each of the six study areas. With these data, the relationship was analyzed between the sensitivity of per capita water consumption to a change in temperature and precipitation. Water consumption in the study areas has values up to three times as high in summer compared to winter. Temperature and precipitation have similar annual cycles, with high temperatures and low rainfall in summer (May to September), and lower temperature and higher rainfall in winter (October to April). For each study area, the statistical analysis was conducted for individual months, with water consumption as the dependent variable and temperature and precipitation as independent variables. This method eliminates the annual cycle in the data (compare Balling & Cubaque, 2009). The mean rate of change in residential water consumption with monthly variations in temperature ($\Delta\text{Cons}/\Delta\text{Temp}$; the units of the mean rate of change are l/p/d per 1 °C) and precipitation ($\Delta\text{Cons}/\Delta\text{Prec}$; the units of the mean rate of change are l/p/d per mm) was determined for each study area by averaging the regression coefficients showing the change in consumption for change in temperature or precipitation for each of the twelve months. The Spearman rank-order correlation coefficient between the $\Delta\text{Cons}/\Delta\text{Temp}$ and $\Delta\text{Cons}/\Delta\text{Prec}$, and land use variables was calculated to determine what influences the spatial variability of the climate sensitivity.

2.4. Institutional and regulatory framework analysis

Several scenarios were analyzed, with the aim of discerning solutions that apply to the crises of capital accumulation, especially those that seem to be related to the purpose of sustainability. First of all, socioecological struggles – such as overcrowding, unsustainability perception and landscape degradation – have promoted the establishment of urban growth constraints, through territorial and environmental planning mechanisms. Such proposals were based on a social consensus about changing the tourism development pattern towards a higher quality model. Sustainability has helped to construct this argument, diverting contention about measures away from exurban sprawl and quality tourism development. The first hypothesis is that this smokescreen is a first sustainability fix that diverts the criticisms, while promoting higher densification of the urban areas and exurban sprawl. Second, another sustainability fix seems to be established through solving water supply by developing yet more technical infrastructure. This can be understood as a spatio-temporal fix solution through over-accumulated capital investment for the

construction of desalination plants, wells and water distribution networks. Further to this, the commodification of the public provision of water supply allows the privatization of a common good.

3. Results and discussion

The empirical and theoretical analyses allowed us to reveal the existence of sustainability fixes for the crisis of capital accumulation within and through the development of quality tourism, in particular residential tourism, in Mallorca. Changing tourism patterns are themselves understood as a sustainability fix, and at the same time they have triggered new urban water consumption patterns and opened up opportunities for a consequent sustainability fix through new arrangements for urban water supply.

3.1. The urban-tourism model, land use, and water consumption patterns

Tourism development has left an imprint on the land surface of Calvià municipality, this seen in an increase in land classified as artificial surfaces (CORINE Land Cover nomenclature, EEA, 2013) from only 0.9% of municipal land in 1956 to 16.7% in 2006 (Pons Esteva, 2011). Urban sprawl expressed as percentage of dispersed urban land to total urban land (CORINE Land Cover nomenclature, 2006) is 80.6% in Calvià municipality, which ranks its urban sprawl second after Andratx, another coastal municipality specializing in second home residential tourism. The results from the analysis of the land use and population geodatabase and the juxtaposition of land use variables and water consumption data provide insights into the composition of per capita water consumption data (Table 1). At 700 l/p/d, the municipality of Calvià has one of the highest water consumption levels on Mallorca (Murray, 2010). The low-density second home residential tourism areas are the main contributors to this high level of water consumption (Table 1). The contribution of the burgeoning of residential tourism to increasing urban water demand has previously eluded statistical observation, and it can only be exposed through empirical and spatial analyses (as presented here) in order to link urban-tourism land use patterns to water consumption. The presence of tourist zones may double the per capita water consumption (Tamoh, Igel, Soler, & Candela, 2008), but the results shown here point to the fact that such figures and comparisons mask the spatially uneven production of urban water demand. For example, at 237 l/p/d the municipality of Palma has a much lower consumption level (Murray, 2010), but it also includes areas like Son Vida, an exclusive luxury suburb with per capita consumption which is five times higher (Table 1). The proliferation of large irrigated gardens and private swimming pools associated with second homes is giving the low-density residential areas an appealing, resort-like character. This is in contrast to the built-up, vertical growth urban form of the established mass tourism resorts. The standardized values of garden and pool area per capita reflect the uneven spatial development of land use patterns in the study areas and the different metabolism of land and water associated with this socio-spatial transformation through urban sprawl and the tourism model shift. Moreover, these results allow for a ranking of the study areas with respect to climate sensitivity as these outdoor uses require high levels of water input. The ratio of summer versus winter water consumption is further evidence of a geographic pattern in climate sensitivity. Low-density urban-tourism areas produce higher water consumption per capita than the mass tourist and high-density residential areas. The per capita differences in water consumption between the second home residential case of Nova Santa Ponça and residential El Toro (Table 1) are also evident on a per

Table 1. Land use and water consumption patterns and urban form in the study areas (2007).

Study area	Average percent garden area (single residential parcels)	Level of pool ownership (% single residential parcels)	Average parcel size (m ²) (single residential)	Water consumption (liters/person/day)	Urban form
Santa Ponça*	23.9	40	1109	209.9	Mass tourism
Palmanova/Magaluf/ Cala Vinyes*	26.1	48	1108	340.7	Mass tourism
Nova Santa Ponça*	29.6	77	1432	771.2	Low- and high-density residential
Sol de Mallorca*	51.2	100	1923	1181.1	Low-density residential
Costa de la Calma*	38.7	42	1023	535.6	Low- and high-density residential
El Toro*	26.5	37	637	187.6	High-density residential
Son Vida	73.2	98	2843	1223.9	Low-density residential

*Sub-municipal district of Calvià.

Data source: Authors' own calculations.

hectare basis. The water consumption in this low-density suburban landscape is 1.5 times higher per hectare than in the more densely built-up El Toro. The urban-tourism water consumption of 3602 m³ ha⁻¹ per year (Nova Santa Ponça) and of 2472 ha⁻¹ per year (El Toro) may seem relatively small compared to an average irrigation water consumption in agriculture in Mallorca of 6,000 m³ ha⁻¹, in Spain of less than 5,400 m³ ha⁻¹ per year, and for golf courses of 8,200 m³ ha⁻¹ per year (Rodriguez Diaz, Knox, & Weatherhead, 2007; Tamoh et al., 2008). But, as Spanish water law prioritizes urban water supply over agriculture and recreational purposes, the projections for climatically induced and increasing competition for water between these sectors is reflected in the results presented here.

3.2. *The urban-tourism model, water consumption, sensitivity, and vulnerability to climate*

The average $\Delta\text{Cons}/\Delta\text{Temp}$ across the six study areas is 52.2 l/p/d, but that value is skewed and ranges from 15.6 to 125 l/p/d per 1 °C. The sensitivity for the $\Delta\text{Cons}/\Delta\text{Temp}$ is positively and significantly (0.05 level of significance) related to the percent of garden area on single residential parcels. The relationships with parcel size and percent of ownership of swimming pools on single residential parcels are positive, but not significant. Precipitation sensitivity is expressed as change in water consumption per change in precipitation. The average across the seven study areas is -1 l/p/d per 1 mm of rainfall. This value is also skewed and ranges from -18.3 l/p/d per 1 mm of rainfall to 10.9 l/p/d per 1 mm of rainfall. The sensitivity of the $\Delta\text{Cons}/\Delta\text{Prec}$ values is not significantly related to the percent of garden area, level of swimming pool ownership or parcel size of single

residential parcels area. The results for the Spearman correlation between $\Delta\text{Cons}/\Delta\text{Temp}$ and the variables of percent garden area, level of swimming pool ownership, and parcel size are 0.89, 0.68, and 0.71, respectively. This compares to 0.07, -0.32 , and -0.21 for the correlation between $\Delta\text{Cons}/\Delta\text{Prec}$ and the variables percent garden area, level of swimming pool ownership and parcel size, respectively. These results suggest that per capita water consumption in the study areas is related more to variations in temperature than to variations in the area's precipitation. Consistent with the findings of other studies in similar climates and contexts, the analysis shows that outdoor uses of water contribute to high levels of water consumption and climate sensitivity and vulnerability (Balling & Cubaque, 2009; Balling, Gober, & Jones, 2008).

These results of the comparative water consumption and climate sensitivity analysis show the degree to which water consumption is affected by, or responsive to, problematic or beneficial stimuli by precipitation and temperature. Climate vulnerability occurs at different spatial and temporal scales and is the degree to which the water demand and supply system for the quality urban-tourism model and landscape is susceptible to changes in climate. The urban-tourism land use patterns increase the climate vulnerability, which is conceptualized in sustainability science as a function of exposure to stressors, sensitivity to associated impacts and the capacity of a system to adapt to these impacts (Turner et al., 2003). The focus is on variations in temperature and precipitation as stressors and the impacts on water consumption. These impacts are mediated by differences in urban form and land use patterns. Added to this are layers of complexity in the water-climate-society nexus that pertain to the challenges of water sustainability on Mallorca and elsewhere in the Mediterranean (Hof, Blázquez-Salom, Comas-Colom, & Barón-Pérez, 2014). Exposure is not only meteorological but related to precipitation shortfalls, groundwater overdraft, water demand, and dependence on desalinization. The water sector in Mallorca shows the typical signs of sensitivity such as a critical level of the water demand-supply ratio, and in this context Hof et al. (2014) have illustrated the dependency on desalination technology as an integral part of the urban-tourist water supply system's capacity to adapt to these impacts.

If the projections for climate change and water scarcity occur for the Mediterranean (Iglesias et al., 2007), then meeting tourists' and residents' water expectations could become challenging. Sustained mass tourist flows and the residential tourism boom increase permanent urban water demand and vulnerability to climate change. The main water source used in Mallorca is groundwater, representing 74.9% of water consumption. The groundwater bodies are already under pressure, and the water supply increasingly relies on desalination and reuse of treated water (García & Servera, 2003; Kent et al., 2002). Thus, water scarcity, intensified in Mallorca by residential tourism, can enlarge the water supply market through its commodification. While the island has significant vulnerabilities to climate change, this challenge is rarely reflected in sustainable tourism policy and planning documents as being an important tourism issue (Dodds & Kelman, 2008). This is the "sustainability fix" orchestrated by quality tourism: instead of redirecting the discourse on water scarcity to one on water demand management, the quality tourism model is presented as a sustainable option and technological, market-oriented solutions for accommodating rising water demand through supply increase are favored. From an urban political ecology perspective, the core question is which interconnected economic, political, social and ecological processes produce these highly uneven urban-tourism landscapes of quality tourism production (Swyngedouw & Heynen, 2003).

This and the preceding sections have discussed water consumption and its climate sensitivity and vulnerability as social and material artefacts resulting from the

appropriation and transformation of land and water through urban change related with residential tourism. The next section focuses on the underlying political and economic processes that bring about environments that reflect and embody such positions of social power.

3.3. *The territorial planning moratorium*

The Balearic Islands have become an important destination for capital investment in the built environment, using it as a fixed asset for consumption fund formation – which is considered the *secondary circuit of capital accumulation* (Harvey, 1978, pp. 106–107). In this way, tourism built environments help to increase the profit rate of over-accumulated capital through its territorial fix; this is by re-organizing space in order to reduce the turnover time of capital by overcoming space and time barriers (Harvey, 1989).

Tourist destinations, such as the Balearic Islands, offer new opportunities for financial capital, shifting its use value as productive tourism accommodation business into speculative stocks, such as villas or luxury condominiums, which are more valuable as exchange values. This involves moving its profitability from the primary towards the secondary circuits of capital accumulation. This shift to exchange values occurs in both rural and in urban areas. A paradigmatic example is how the transnational capitalist class has chosen the Balearic Islands to establish their luxury villa second homes in the countryside (Sklair, 2000, p. 67).

Regulatory constraints, especially regional and urban planning, have restricted urban growth in the Balearic Islands during recent decades. First of all, regulation worked from 1984 onwards through natural area protection, and particularly through the [Law 1/1991](#) of natural areas of special interest. The Land Use Planning Directives of 1999 ([Law 6/1999](#)) established that no new urban settlements can be created outside a 500 m buffer zone from the consolidated urban areas, excluding also another 500 m buffer zone from the coastline. Several moratorium norms for urban growth were applied by the regional and local administrations during the 1990s and beginnings of 2000s (Bauzà van Slingerlandt, 2007). Additionally, the Insular Land Use Plan of Mallorca of 2004 ([Agreement of the Consell de Mallorca, 13/12/2004](#)) determined that new urban developments must have their dwelling capacity tied to low population densities: 60 inhabitants per hectare in tourists areas, 120 in the larger towns with a municipal function (Palma, Inca and Manacor) and 100 for the rest of the island (where the norm is 7.4). These reductions of potential growth capacity have been interpreted as examples of strong sustainability, based on high-quality democratic decisions (Bauzà van Slingerlandt, 2007, p. 17; see Bianchi, 2004, p. 512 for similar moratorium constraints in the Canary Islands).

This regulatory framework can only be explained because of the electorate's commitment to protect their landscape and to curb environmental degradation, resource overuse and overcrowding. That commitment is also promoted through corporate environmentalism, with hotel and land owners arguing for the hegemony of this sustainable development historical bloc (Sklair, 2000), which benefits them through the increasing value of their capital stocks. The rhetoric of sustainable development is understood as “the way in which the ideas and agendas of particular interest groups are promoted and imposed over a world of diversity, full of conflicting values and interests” (Igoe, Neves & Brockington, 2010, p. 489). It has been used to manufacture a consensus so as to maintain hegemony in the hands of the ruling elite. The historical period of regulatory constraints to urban growth through the “moratorium” coincides in time with the internationalization of the Balearic hoteliers, from the middle 1980s until the beginning of the current crisis. The

Table 2. Long-term land use and land cover change on the island of Mallorca 1956–2006.

Land use type	Unit	1956	1973	1995	2006
Urban, industrial, transport infrastructure, golf courses and quarries	km ²	56.26	125.35	270.65	309.85
	%	1.13	2.52	5.44	6.24
	ha/day variation		1.113488	1.809426	0.9763462
Farm land	km ²	2939.45	2883.11	2774.91	2747.00
	%	59.14	58	55.82	55.25
	ha/day variation		−0.90798	−1.34746	−0.6949763
Woodland and scrub	km ²	1938.38	1925.48	1888.64	1877.97
	%	39	38.73	37.99	37.78
	ha/day variation		−0.20793	−0.45885	−0.2655766
Inland waters	km ²	36.62	36.01	35.83	35.41
	%	0.74	0.72	0.72	0.71
	ha/day variation		−0.00988	−0.00222	−0.010401
Water surfaces	ha	0.00	1.04	1.04	1.04
	%	0	0.02	0.02	0.02
	ha/day variation		0.016,772	0	0

Data source: Pons Esteva 2011.

simplest explanation is that their most profitable investments were outside the Balearic Islands, and thus the public institutions could then regulate according to the social consensus for containing urban growth.

As a result there has been a decrease in the rate (in hectares per day) of urban development for the Balearic Islands (Table 2). From the rapid growth of 1.11 ha/day during the beginnings of the tourist “boom” between 1956 and 1973 it rose further to 1.81 ha/day in the final period of the Fordist model of mass tourism development between 1973 and 1995, and it then fell to 0.98 ha/day despite the ongoing housing bubble in Mallorca (Pons Esteva, 2011).

3.4. *Avoiding the moratorium*

Comparison of this Balearic trend with trends in other close-by tourist regions led Rullan (2011) to argue that insularity and the seasonality in tourist arrivals have been the main explanatory factors for this more recently reduced urban growth, although he does not discard a possible causal link to planning restrictions. Nature conservation and quality tourism discourses serve to perpetuate a myth of strong government intervention in the tourism sector, but in fact government is committed to a growth-centered model. This can be observed particularly in the countryside where the process manifests itself in exurban sprawl through the informal construction of isolated villas. This process has been analyzed by Hof and Blázquez (2013), who have provided evidence of a proliferation of second homes (226,590 buildings in 2006, which is 4.3 times higher than in 1987, with 18,621 swimming pools) in new urban fabric areas, and through the growth of isolated dwellings and holiday villas in the countryside (Figure 3). It was shown that second homes, isolated dwellings, and holiday villas have all been improved through the construction of swimming pools in order to

enhance their profitability on the second home rental market. Through these interdependencies, residential tourism is connected to urban growth and exurban sprawl, while both are driven by capital investment based on both real estate use value and exchange value. Last but not least, the interests behind these investments have promoted a new regulatory framework of flexibilization and ex-post legalization. These exurban sprawl processes have not been stopped by the urban growth constraints, resulting in the territorial expression of the Balearic Islands' changing tourism patterns, and adding countryside dwellings with financial appeal to residential tourists. This same model of elitist tourism, both rural and urban, has been described by Bianchi (2004) as a form of product diversification that contributes to unequal structural weaknesses in regional economies, due to the clientelistic interests of powerful regional cliques. The tougher restrictions through the “moratorium” laws on urban-tourism sprawl and on the expansion of bed stock have helped to sustain the accumulation of capital for the benefit of a minority, but with the alibi of fixing it in environmentally friendly or sustainable ways. Notwithstanding that, the potential tourist rental from holiday villas of the registered 226,590 buildings in the Mallorcan countryside (2006) is spreading the income benefits from the second home rental market among the local middle class and landowners.

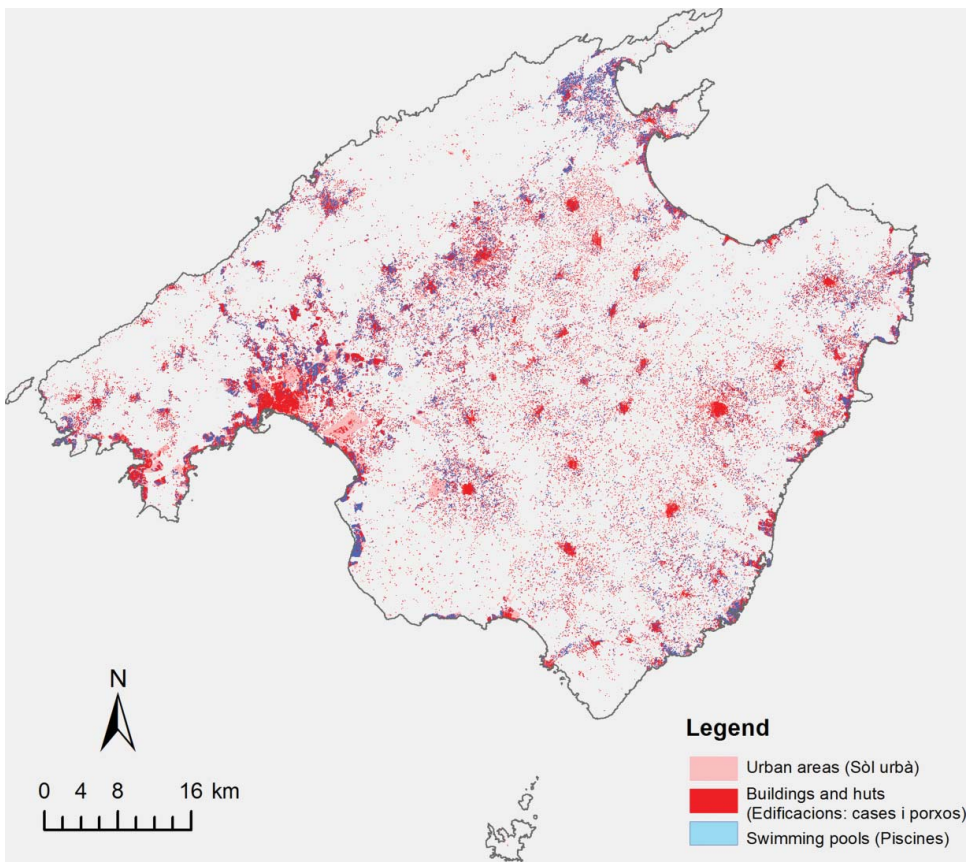


Figure 3. Swimming pools and human dwellings usable as residential houses in Mallorca. Source: Authors' own elaboration based on raw data from the Topographic Map of the Balearic Islands (2006), data used with permission from Sitibsa S.A., Palma (Mallorca).

3.5. *Flexibilization of territorial and environmental planning*

The current regulatory planning has changed, with a withdrawal or weakening of many of the Balearic Island's democratic territorial protection measures. This adaptation of the regulatory framework corresponds to the "flexibilization" that characterizes the post-Fordist accumulation regime (Jessop, 1992). A new regulatory framework, with the alibi of trying to mitigate the effects of the economic crisis, is promoting further investment in the new urban fix. The Law 4/2010 consists of urgent measures to promote investment in the Balearic Islands, establishing the new legislative idea of a "regional interest investment", which is an agreement for urban development cooperation from the public administration in order to streamline institutional paperwork. Specifically, it requires that "Any administrative institution of the Balearic Islands must handle the investments of regional interest through separate, preferential and rapid administrative procedures" (Law 4/2010, article 5.3, p. 6). For instance, two big hotel chains are making profits from this new procedure in Magaluf, which is the biggest mass tourism resort in Calvià. Meliá Hotels International Inc. is shifting the exploitation model for seven of its eight hotels in the resort towards their conversion into commercial malls, attractions and condominiums, all with an interest in the private management of the beach. In addition to upgrading their tourist offer, the intention is to sell the fixed capital in the global financial stock markets. Another outcome is to transform the company's Balearic hotel model into something that is closer to the "enclave" resorts that they manage in destinations in the impoverished South (Blázquez, Cañada, & Murray, 2011). Second, Viva Hotels Inc. is promoting the construction of four new hotels with 2,000 beds and a commercial mall of 15,000 square meters (Yrigoy & Rullan, 2014), on a plot of 66.3 hectares, which involves the silting up of an ecologically valuable wetland.

The new Tourism Law (8/2012) allows for changes in the use of tourist accommodation businesses (article 78), which was until then strictly forbidden, in order to make possible their fractional sale as investment stocks. This facilitates capital fixation through the secondary circuits of capital accumulation. Its purpose is to attract global capital, which is supported by a special issue of the Official Gazette that was published with the Law being available online in English, German and Russian. Experiences from Australia's Gold Coast, a classic example of a mass tourism resort, have shown that the introduction of condominium style accommodation may inhibit destination rejuvenation. This is mainly because this development can signify a changed profile for a destination, and in some resorts it can contribute to the gradual loss of branded hotel icons (Warnken, Russell, & Faulkner, 2003). Moreover, this development is more driven by speculation in the real estate business than by actual tourist demand. For the municipalities, the outcomes are increased use of energy, water, building land and higher loads of sewage and solid waste, while the supply of revenue from conventional tourist accommodation and services is decreasing (compare Warnken et al., 2003). In Mallorca, these destination management challenges seem to be ignored, since this type of development is regarded as one component of the destination's move to higher quality tourism (*Mallorca de lujo*).

Deregulation is a neoliberal way to deal with the current crisis of capital over-accumulation (Peck & Tickell, 2002), which can also involve regulating by legalizing what the market demands: in other words, "rolling-with-it" (Keil, 2009). This can be seen, for instance, in the Balearic Islands, where the Government is dealing with the crisis through adapting the planning to the promotion of financial capitalism, by the ex-post legalization of houses built in exurban sprawl in the Balearic Islands' countryside, even though they may have been built without planning permission from the public administration (Hof &

Blázquez, 2013, p. 258). This last notable change in rural planning has been established through [Law 7/2012](#), which is described as “urgent measures for a sustainable urban planning” (*medidas urgentes para la ordenación urbanística sostenible*). The name given to this law is a good example of the use of rhetoric to support a neoliberal regulatory shift.

The deregulation of the environmental planning has been established through a decoupling of the environmental requirements, such as ensuring there is sufficient water supply for the urban growth. This deregulation has been established by new legislation. Since this new legislation was enacted, in order to overcome the time involved in administrative processing it has become unnecessary for reports to be made by the public administration in charge of hydrological planning, which can be seen within the context of the rolling back of the State’s role. This environmental regulatory change has been introduced through the [Law 6/2009](#), on environmental measures to promote investment and economic activity in the Balearic Islands, and which was issued as a remedy to the financial crisis through deregulation.

3.6. New water supply infrastructure and privatization

The aesthetically pleasant quality tourism model in Mallorca provides empirical evidence of capitalism’s contradiction. This model has resulted in a worsening of environmental and social threats due to its contribution to uneven geographical development (Smith, 1984). Furthermore, most of the answers to the current crisis maintain the dogma of growth, through the implementation of neoliberal policies of privatization, commodification, deregulation, and market proxies (Castree, 2008, p. 142).

The supply of water in Calvià has evolved towards the privatization of the water management companies. All of these water companies were publically owned until the 1990s, when neoliberal capitalism made popular its argument that privatization and the free market were good for ecological stewardship (Castree, 2008, p. 146). Nowadays, only EMAYA (Empresa Municipal d’Aigües i Clavegueram) is publically owned and managed, while Calvià 2000 has privatized its management, and ATERCA (Aguas del Término de Calvià) is owned by Aguas de Barcelona, whose parent company is the French transnational company Suez Environment. This last corporation also owns SOREA (Sociedad Regional de Abastecimiento de Aguas), through which they control the water supply to the main tourist areas in Mallorca and Menorca. Water supply to Ibiza and Formentera’s main tourist areas is almost completely under the ownership of AQUALIA (Aqualia Gestión Integral del Agua), which is a branch of the Spanish public works company Fomento de Construcciones Y Contratas (SABI, 2012).

Calvià’s water supply for 2008 was 13,045,630 m³ (which is 13% of Mallorca’s total), based on groundwater exploitation and desalination. Desalinated water comes from a desalination plant constructed in 2000 in Son Ferrer (Calvià) that treated 1837,557 m³ in 2008, and partially from Palma’s desalination plant that began operations in 1999 and which provided 16,700,648 m³ in 2008 (Govern de les Illes Balears, 2012). Increasing reliance by this outstanding tourist municipality on desalination for water supply to the urban and tourist sector is indicated by data showing that 41% of the total desalinated water produced in Mallorca was delivered to Calvià municipality. Moreover, the proportion of desalinated water in the total water supply to the municipality was up to 89% at some times of the year between 2003 and 2007. Given the high energy demand for desalination (on average, 3.5 KWh per m³), this technological fix is considered to be a poor adaptation strategy to the accelerating water demand in the face of water shortages induced by climate change throughout the tourist zones in the Spanish Mediterranean (Hof et al., 2014; Saurí et al.,

2011). Furthermore, construction costs of the desalination plants (2,001,751 Euros for the plant located in Son Ferrer, Calvià; and 14,551,578 Euros for the one located in Palma), have contributed to the indebtedness of the public administration, and has thus contributed to the financial crisis of the Spanish state (Murray & Blázquez, 2009).

3.7. *Technological sustainability fixes*

The sustainability fix associated with the water scarcity management described above concerns the privatization trends in the Calvià water sector. It involves the commodification of this resource, in a policy climate that still adheres to the hydraulic paradigm, which is a concept focused on water supply enhancement through such technological solutions as desalination plants, rather than focused on water demand management. These solutions, however, represent a lock-in to conventional environmental management under a pro-growth paradigm, and once the limits of technical solutions to water supply enhancement are reached, such as due to energy prices or CO₂ mitigation in the case of desalination, then more efficient water demand management may be required. Of course, an economic and logical consequence of such a pro-market neoliberal development scenario would be to increase the market price of water in order to change policy and behavior. Instead, the social tension over inequitable water management is postponed, but not solved, by the current policies. The “sustainability fix” safeguards a scenario of environmental damage to the groundwater bodies, rising energy consumption for desalination, and the deepening of social inequality as a result of accumulation by dispossession (Harvey, 2003), that in the case of this study is seen through the privatization and gentrification of common resources such as water supply.

The second lock-in to the growth model and conventional environmental management is manifest through the lack of awareness of, and focus on, climate change adaptation strategies. Current environmental policy does not reflect the necessity for an improved management of outdoor water consumption nor the challenges posed by rising temperatures, climate change and increasing tourism flows (Dodds & Kelman, 2008). The results presented here suggest that the island’s vulnerability to climate change is being exacerbated by the combination of exurban sprawl, an artificialization of the island’s landscape that directly increases the sensitivity of water consumption to variations in climate, and the critical water supply situation. This vulnerability is a function of the well-known stressors on the island’s water sustainability, and climate change is expected to amplify these stressors. The climatic and hydrogeological situation on the island is causing water supply problems, while tourism as a major economic activity is an important contributor to the water demand problems (Kent et al., 2002). Despite this academic evidence and discourse, adequate water demand management strategies are yet to be factored into sustainable tourism policies. Better information on tourism’s water demand and of its different sub-sectors (second homes, facilities, activities, etc.) as it is presented here is needed by the State and local authorities in order to define the priorities for water saving or demand management programs. It is also required by tourism businesses, which will benefit from such information in terms of cost savings or risk reduction (Deyà & Tirado, 2011; Eurostats, 2009; Gössling et al., 2012).

4. Conclusions

This comparative study of per capita water consumption across the whole range of urban-tourism forms exposes the impact of second home and residential tourism on urban water

consumption and its vulnerability to climate. The changing tourism patterns are a result of the diversification of the tourist product, mainly the strategic move towards higher quality tourism. For Mallorca as a tourism destination, this strategic move was sustainable in economic and managerial terms, but not in environmental terms. Quality tourism has sparked another form of social appropriation and transformation of the natural resources on which it is most dependent in order for it to be sustained in the future. Increased irrigated landscaping for gardens, public green spaces, swimming pools, and the provision of golf courses are driving additional demand for water. Land use patterns and water consumption were studied for sub-municipal districts in Calvià. The highest water consumption per capita and day are observed in the exclusive residential tourism areas that also have the highest percentages of gardens and swimming pools per parcel. These ratios of water consumption are six times higher than in a traditional mass tourist resort, such as Santa Ponça. The comparison of second home residential districts shows water consumption per capita and day to be threefold higher for “quality tourism” examples, with more irrigated gardens and swimming pools.

In the case of water, the “sustainability fix” benefits capital invested in supply enhancement rather than challenging the increasing demands that are driven by tourism itself and the artificialization of the urban fabric through water-related amenities (irrigated gardens planted with turf grass and other water-demanding plants, and swimming pools). In this way, the “sustainability fix” represents one of the most prominent problems of higher quality tourism, creating a lock-in to a conventional growth model in the urban water sector and also an opportunity for the commodification of water supply.

In Mallorca, the sustainability fix crystallizes in the advocacy of “quality tourism” as an environmentally friendlier alternative that at the same time creates more revenue than mass tourism. This way, the transformation of urban and ex-urban space by residential tourism, the spread of golf courses and water-related amenities in the private real estate realm were marketed as a sustainable tourism strategy in a small island with limited water resources. The social consensus around quality tourism drives the flexibilization of territorial and urban planning, allowing ex-urban sprawl and the restructuring of mature resorts. The dependency on mass tourism and the lock-in to its growth model is complemented and reinforced by a new dependency on continuing residential growth. This development may promote an entrepreneurial form of water governance on the island, with the sustainability fix blocking innovative and proactive urban-tourism policies dealing with global change pressures, such as climate change.

The neoliberal capitalism period, from the 1990s to the 2007 crisis, witnessed a change in tourism patterns in the Balearic Islands, known as the “third tourism boom”. It was characterized by the containment of urban sprawl combined with an increasing dwelling capacity and more ex-urban sprawl, particularly for the development of countryside villas with swimming pools for non-hotel tourism use. The resulting real estate market has enlarged its exchange value returns through the so called secondary circuit of capital accumulation (Hof & Blázquez, 2013). These changes have provided exits for the current capitalism’s systemic crisis, but they may deepen the metabolic threat, as the capital accumulation solutions to capitalism’s contradictions have worsened the environmental crisis, in this case in terms of water scarcity and vulnerability to water scarcity induced by climate change.

The social consensus has led the regional planning towards constraining urban growth but allowing ex-urban sprawl. This regulatory framework is interpreted as the result of a “sustainability fix”. This “fix” allows the investment of over-accumulated capital to take profit from the sustainability rhetoric by solving the second contradiction of capitalism.

This involves considering quality tourism as a solution to the metabolic rift, when it is not a solution according to the reported water consumption data. It turns capitalism constraints, such as water scarcity, into expansion opportunities. For instance, this occurs through its privatization of supply and its construction of public megaprojects, like the new desalination plants supplying Calvià's urban-tourism water needs. Mallorca is like an early warning system, where sensible future destination management policies have been considered or can be applied easily. The results and the discussion presented here have highlighted the challenges associated with developing a collective approach to managing water resources on the island of Mallorca. Exposing the workings of the sustainability fixes could be a first step in opening up the discourse towards more proactive forms of urban-tourism spatial development and water governance.

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Notes

1. Undertaken for the European Commission by the University of Surrey, Intasave (Not-For-Profit Company) and Sustainable Travel International (Not-For-Profit Organization).
2. The conversion to z-scores (or standard scores) converts values from their original unit of measurement to the unit-less standardized (Z) scale. In the process, data values are represented by their relative position in comparison to the mean. This deviation is then divided by the standard deviation for the distribution. The resulting Z-value (or standard score) can be interpreted as the number of standard deviations an observation lies above or below the mean. Here, geographic data measured on different scales are converted to a unit-less relative scale for statistical analysis.

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