The impact of climate change on water use in the tourism sector of Cyprus

Katerina Charalambous, Adriana Bruggeman, Manfred A. Lange

Energy, Environment and Water Research Centre

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The European-funded CLICO project mobilizes 14 research teams and brings together for the first time some of the world's leading researchers in water resource, vulnerability, and peace and security studies. Eleven cases of areas where droughts or floods pose threats to human security are studied ranging from Niger, Sudan, the Jordan and Nile basins to Cyprus, Italy and the Sinai desert. A large dataset – the first of its kind – of hydro-conflicts and cooperation at the domestic level in the Mediterranean, Middle East and Sahel will be regressed against climatic, hydrological and socio-economic variables. The resilience of international treaties in the region to deal with climatic variability will be addressed and national and international policies will be evaluated, the aim being the development of a suitable international institutional framework for dealing with the human security implications of hydro-climatic hazards.

The CLICO project is coordinated by Institute of Environmental Science and Technology, Universitat Autonoma de Barcelona, Spain.

The information presented in this report forms part of a study on climate change and water scarcity in Cyprus. For more information, please see: http://www.cyi.ac.cy/node/698 and http://www.clico.org/.

Introduction

The Mediterranean is one of the world's most popular and successful tourist destinations with over 120 million visitors every year. However, heat waves, droughts, storms and floods, which are expected to become more frequent and extreme, will certainly affect tourism in the region. Tourism is a continuously adapting industry, affected by changing demographic and economic conditions (Perry, 2006), as well as political events, new technologies and trends. It is therefore very difficult to distinguish the impact of climate change from other factors that influence tourist destination choices. As Perry (2006) rightly notes predicting climate change is complex, predicting how people will respond to that change is even more complex. The most vulnerable tourists will be campers and caravaners, as they are exposed more to heat waves due to being outdoors and have no access to air conditioning.

Tourism is directly or indirectly dependent on water, whether it is winter tourism, agrotourism, wildlife tourism or 'sun and sand' tourism. Cyprus attracts a large number of its tourists in the summer season due to its good weather and beaches. However, just like other destinations in the Mediterranean region, Cyprus has been affected by droughts and extended heat waves. The reporting of these events in the media, such as the 52 deaths that were attributed to the heat wave in August 1998 (CRED, 2011), may affect tourist numbers. On the other hand, the influx of tourist masses drive up the often already high local water demands, while climate change projections indicate that natural water supplies may become even less.

The number of tourists that visited Cyprus reached nearly 2.2 million in 2009 (Cystat, 2009), with the highest numbers arriving in the summer season (July, August, and September). Figure 1 presents tourist arrivals to Cyprus between 2001 and 2010 and a breakdown of these arrivals by season. A small decrease can be noticed for the winter and autumn season, while arrivals increased slightly during the summer and spring season. Cyprus tourism created a revenue of 1,493 million euro in 2009, providing 38,000 jobs (Cystat, 2009). The tourism GDP share between 1990 and 2005 was estimated to be 15-20% (Planning Bureau, 2007).

While there are a range of values reported for tourist consumption per capita (Figure 2), reaching up to 2,000L/d (Gössling, 2012), there are very few studies that assess the total amount of freshwater consumed by the tourist sector. An assessment study of the Cyprus' water resources and water demand in 2000 indicated that daily per capita water use of tourists in Cyprus is more than double that of local residents. Consumption can, of course, vary depending on the type of lodging and facilities such as swimming pools and golf courses. Tortella and Tirado (2011) mentioned several authors that have made calls for further research into the tourist water demand, especially for tourist destinations with water supply problems. Hotels, however, investing in water saving appliances and practices may reduce their water consumption and improve their water management.

A modelling study based on a hotel survey in Majorca estimated that hotels that had adopted water saving initiatives reduced their annual average water consumption by 13.6% (Tortella and Tirado, 2011). Possible ways of reducing water use in hotels include the planting of drought-tolerant vegetation in gardens, increasing the efficiency of irrigation, the use of alternative sources for irrigation such as grey water or treated wastewater, avoiding the construction of large swimming pools, fitting water efficient devices in guestrooms and kitchens along with educating and informing hotel staff and guests on how to save water (Lamei et al, 2009a; Gössling et al., 2012). Lamei et al. (2009b) developed a model to estimate hotel irrigation water needs, thereby minizing water supply contract costs for hotels.

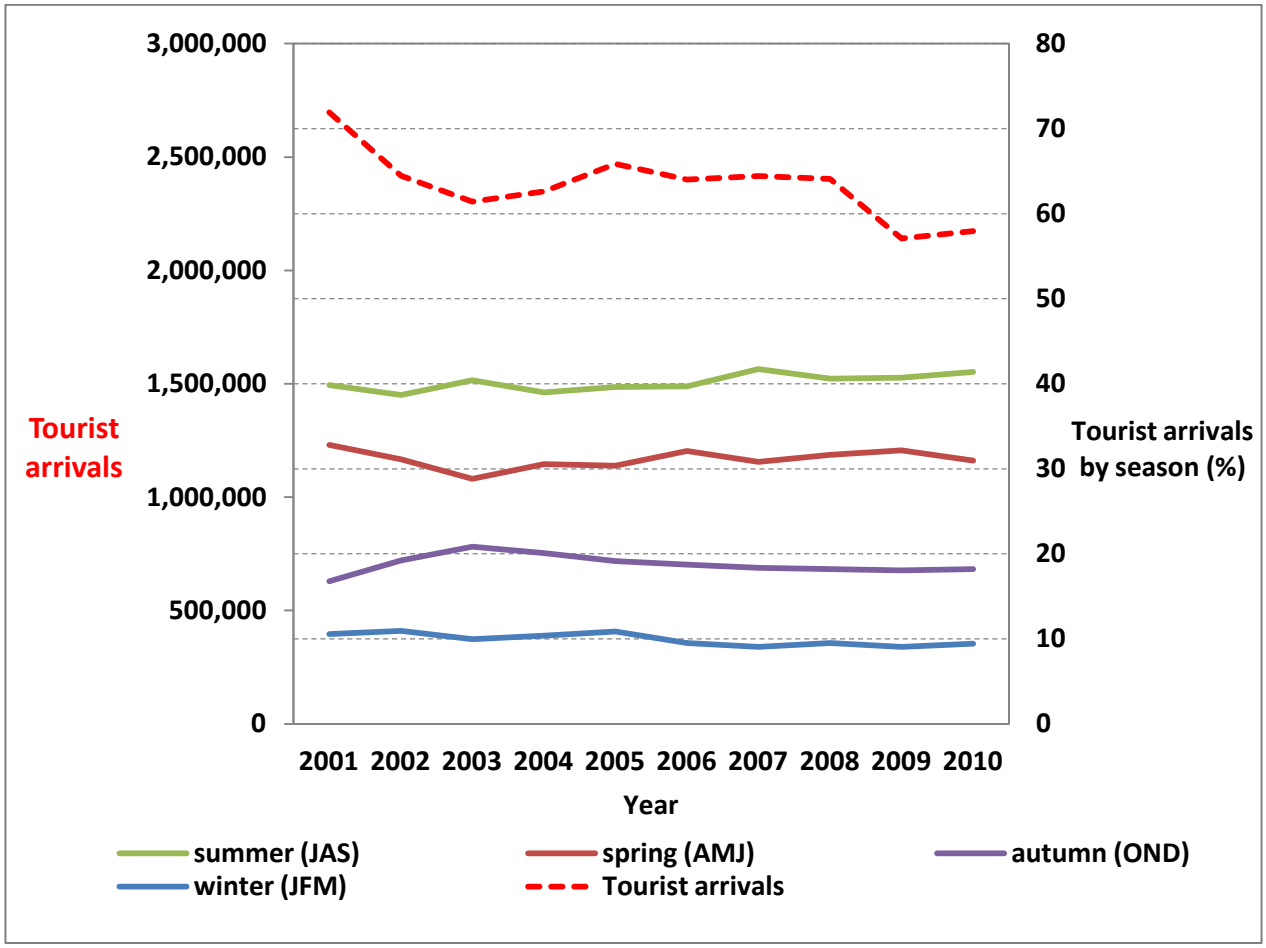

Figure 1 – Tourist arrivals to Cyprus and breakdown by season

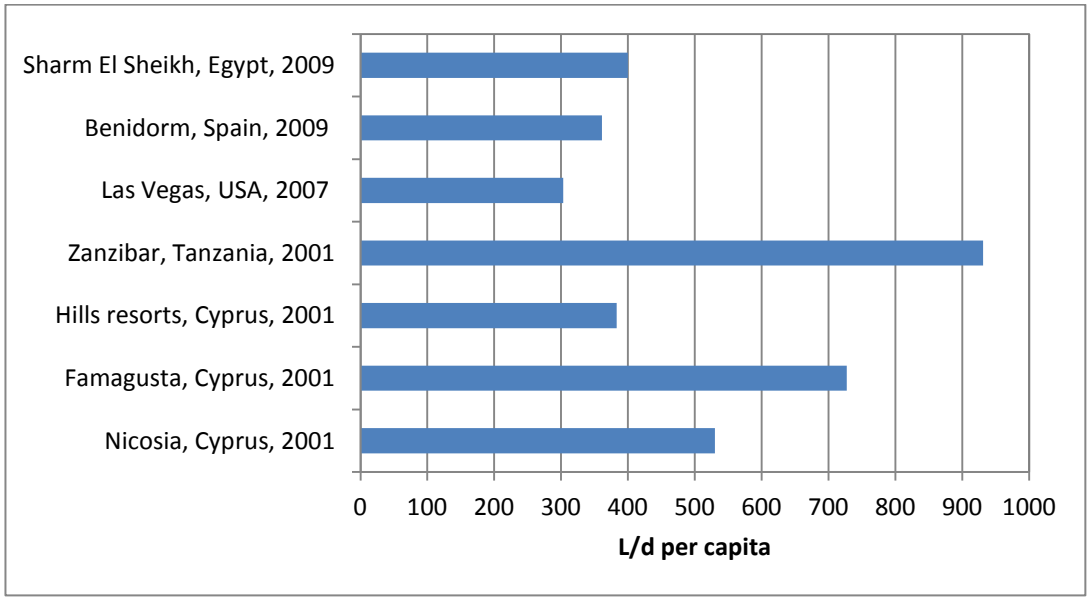

Figure 2 – Global tourism water consumption (Numbers taken from: Gössling, 2001; WDD-FAO, 2001; Lamei et al., 2009; Ricos-Amoros et al., 2009; Gössling et al., 2012)

Water supply for the tourist sector is the last to be affected in Cyprus during drought periods. However, droughts in the recent past have led many hotels to invest in water saving appliances and practices. Still, there seems to be limited concern in the tourism sector about extreme climate events or climate change, considering that no questions related to heat or water shortages occurred in the 2010 tourist satisfaction survey (University of Cyprus Economics Research Centre and Cyprus Tourism Organisation, 2011).

To assess the impact of climate change on water use and supply in the tourism sector in Cyprus, and the measures undertaken for adaptation, a survey was undertaken between October and December 2011.

Methods

Hotel water use and supply under climate change in Cyprus was investigated through a web-based survey distributed to 360 hotels, apartments and guesthouses. The survey was sent out to all e-mail addresses in the list of tourist accommodations of the Cyprus Tourism Organisation, with a link for participants to access the questionnaire (provided in Appendix 1). The questionnaire was kept brief to increase the chance of response. Forty e-mails were returned as addresses were not correct. This reduced the sample size to 320 tourist accommodations. Two reminders were also sent out.

Results

A total of 36 tourist accommodations completed the survey, a response rate of 11%. The majority of survey respondents were located in coastal areas, followed by others located in areas such as Nicosia and a few in the mountainous areas (Figure 3). The accommodation size of the survey participants varied, but the majority had between 100 and 300 guest beds (Figure 4). Out of the 36 respondents 21 answered that they had faced minor problems during drought periods of the last 15 years, while 7 said that their business had been affected (Figure 5).

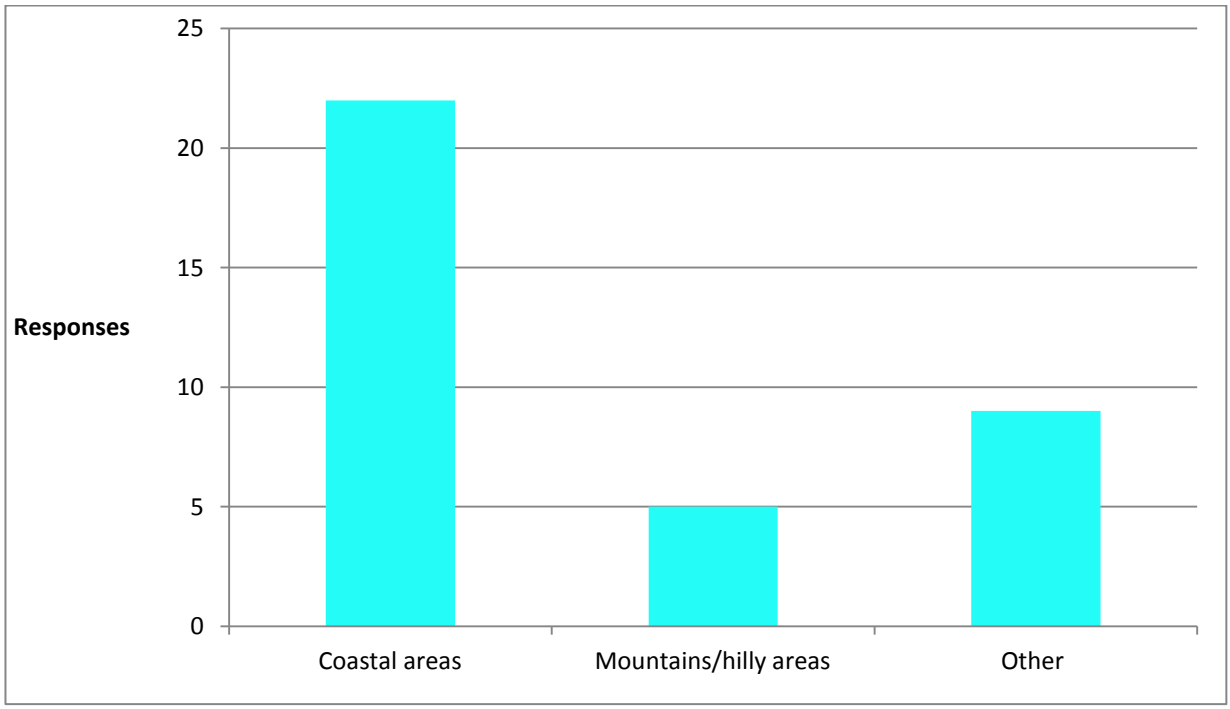

Figure 3 – Location of accommodation that took part in survey

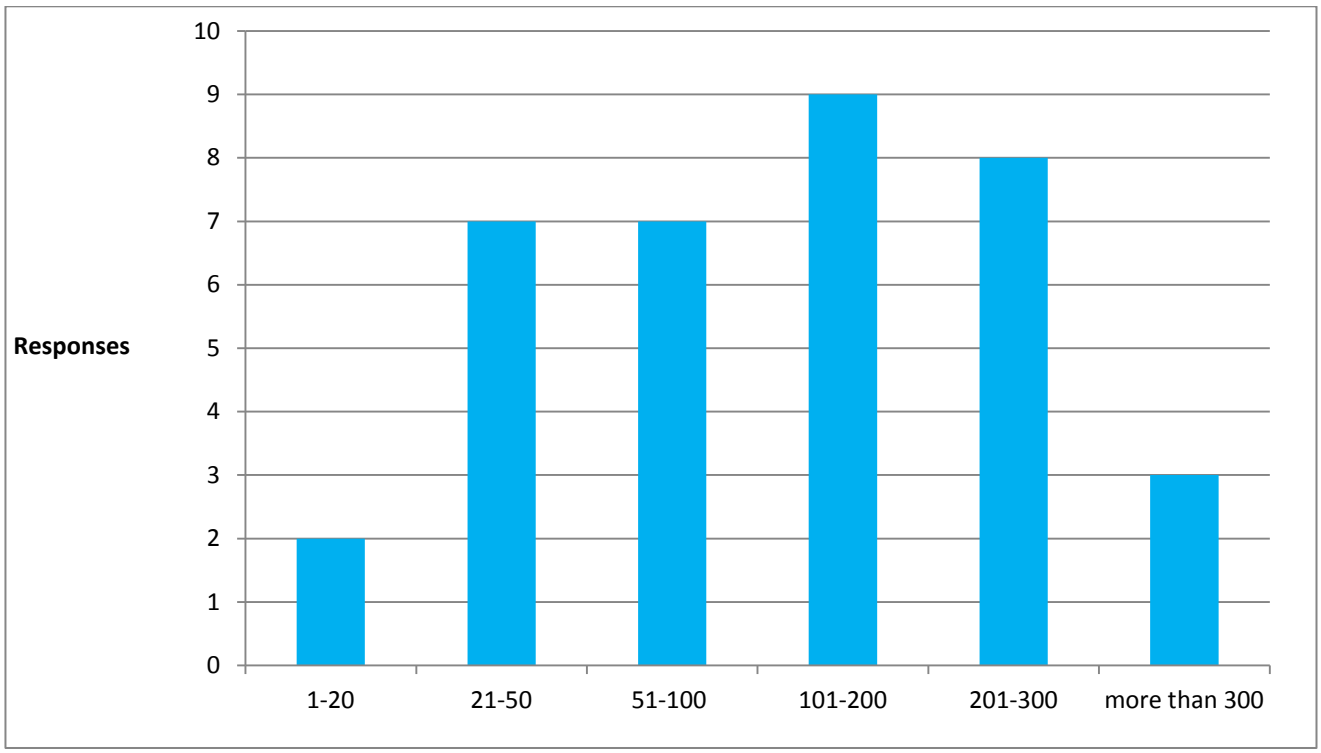

Figure 4 – Size (bed number) of accommodation responses

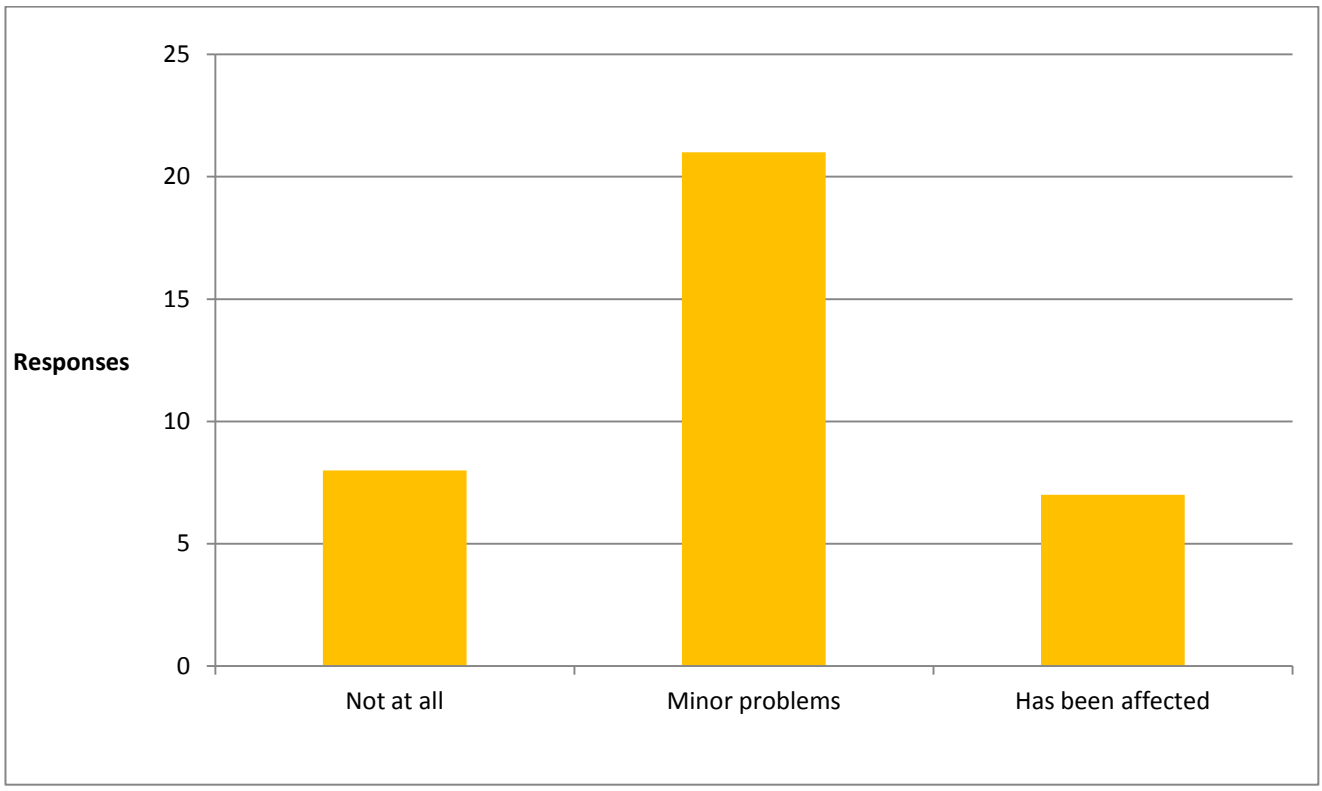

Figure 5 – Tourist accommodation business affected by drought periods of the last 15 years

Most of the respondents do not have access to their own potable water supply and are connected to the potable water network. There are a few that have access to groundwater from an on-site borehole or potable water delivered by road tankers (Figure 6). Most swimming pools are filled with potable water from the network, while water from on-site boreholes and tankers is also used (Figure 7). As expected, wastewater from the tourist accommodation was disposed off in the sewerage network, although a very small number disposed of their wastewater through cess-pits or on-site wastewater treatment facilities, where the treated effluent was used for irrigation (Figure 8).

Most of the respondents have water saving devices in their accommodation, such as water-efficient showerheads and dual flush toilets, and to a smaller extent water saving taps and toilet cistern bags (Figure 9). With regards to water saving habits adopted by tourist accommodations, nearly all respondents reported that they train staff to be aware of water use, a large number also have notices in bathrooms for guests to use water wisely, and some also have notices in guests bedrooms to indicate when they require clean bed linen or towels (Figure 10). Garden irrigation in hotels is mainly carried out by drip or micro sprinkler systems or with a hosepipe (Figure 11). Very little to none have drought tolerant vegetation that requires little or no water, an option that should be opted in order to minimize or eliminate the need for irrigation water.

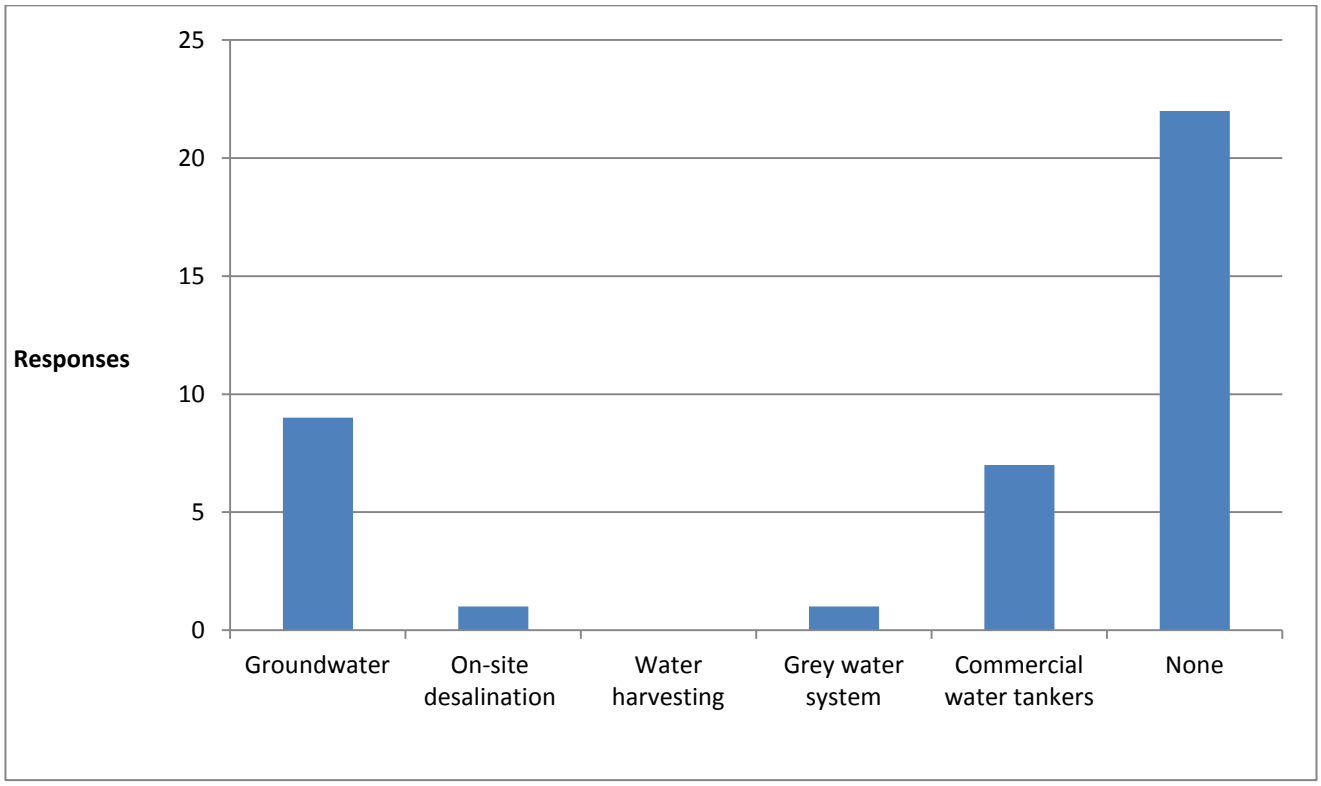

Figure 6 – Access of tourist accommodation to own water supply

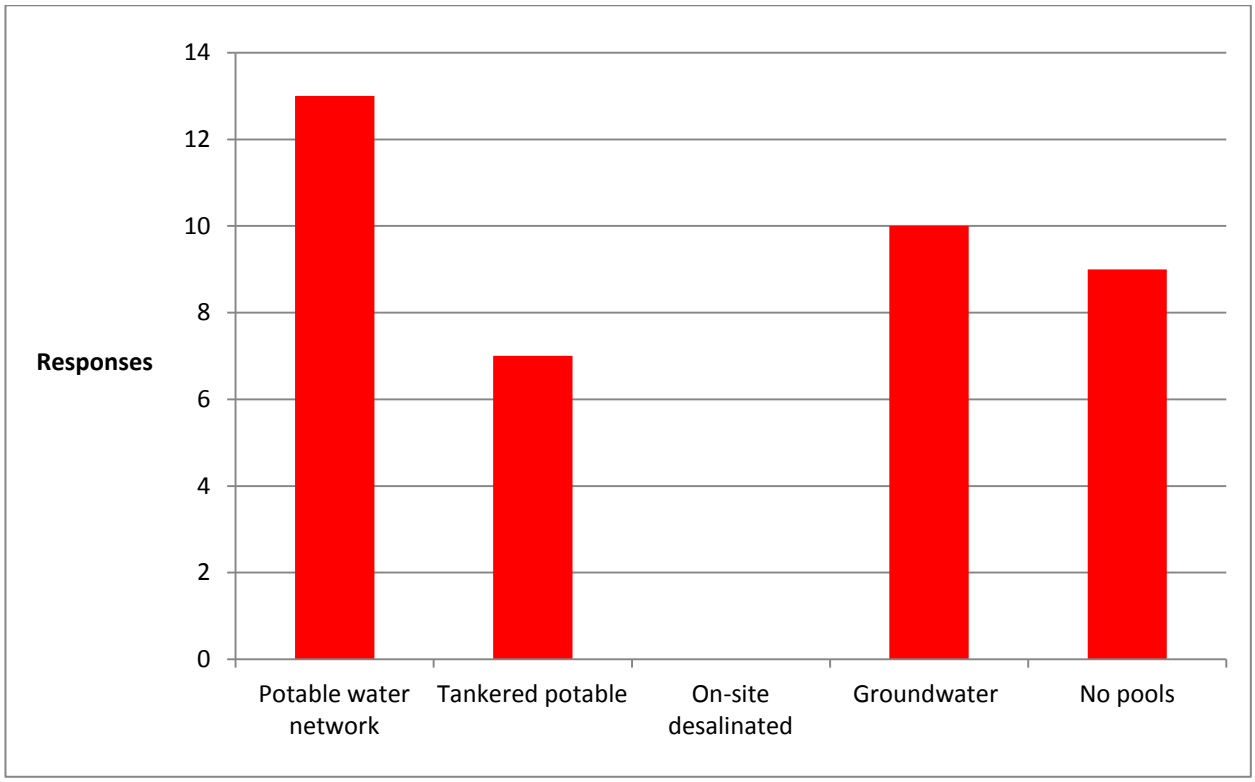

Figure 7 – Swimming pools water sources for tourist accommodation

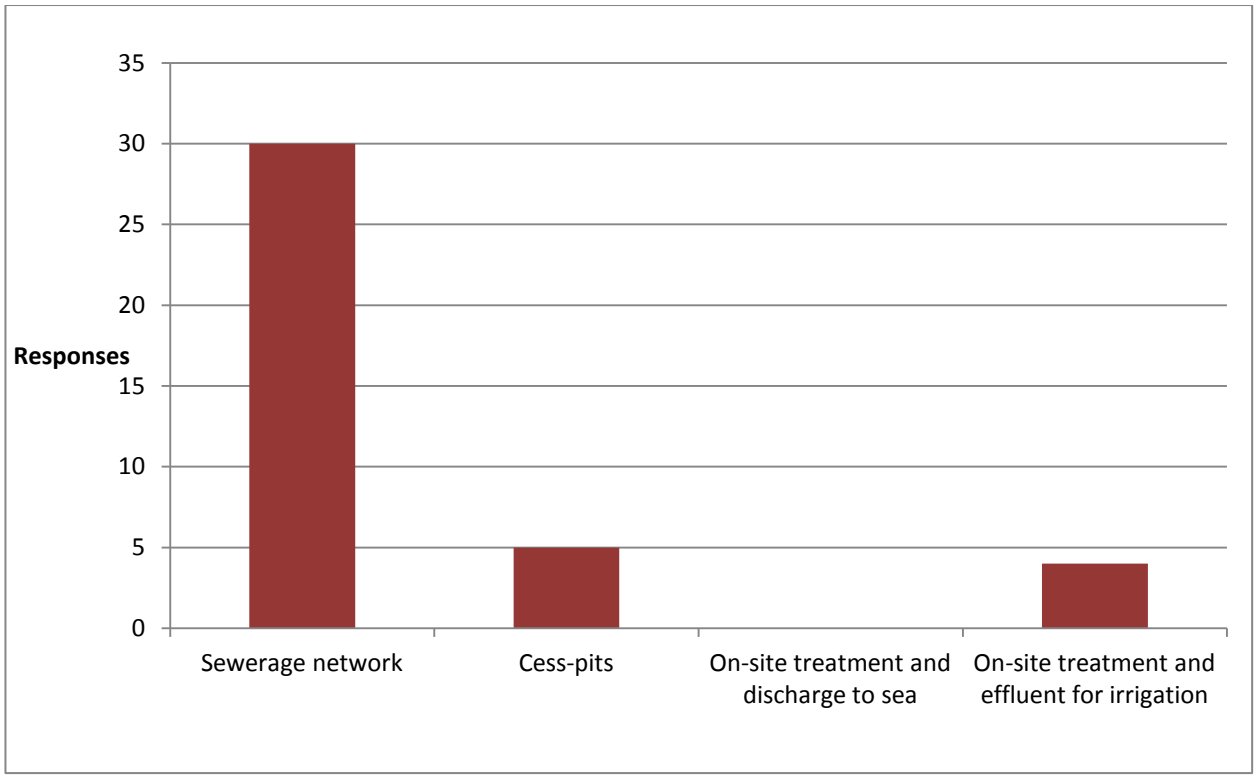

Figure 8 – Disposal of wastewater from tourist accommodation

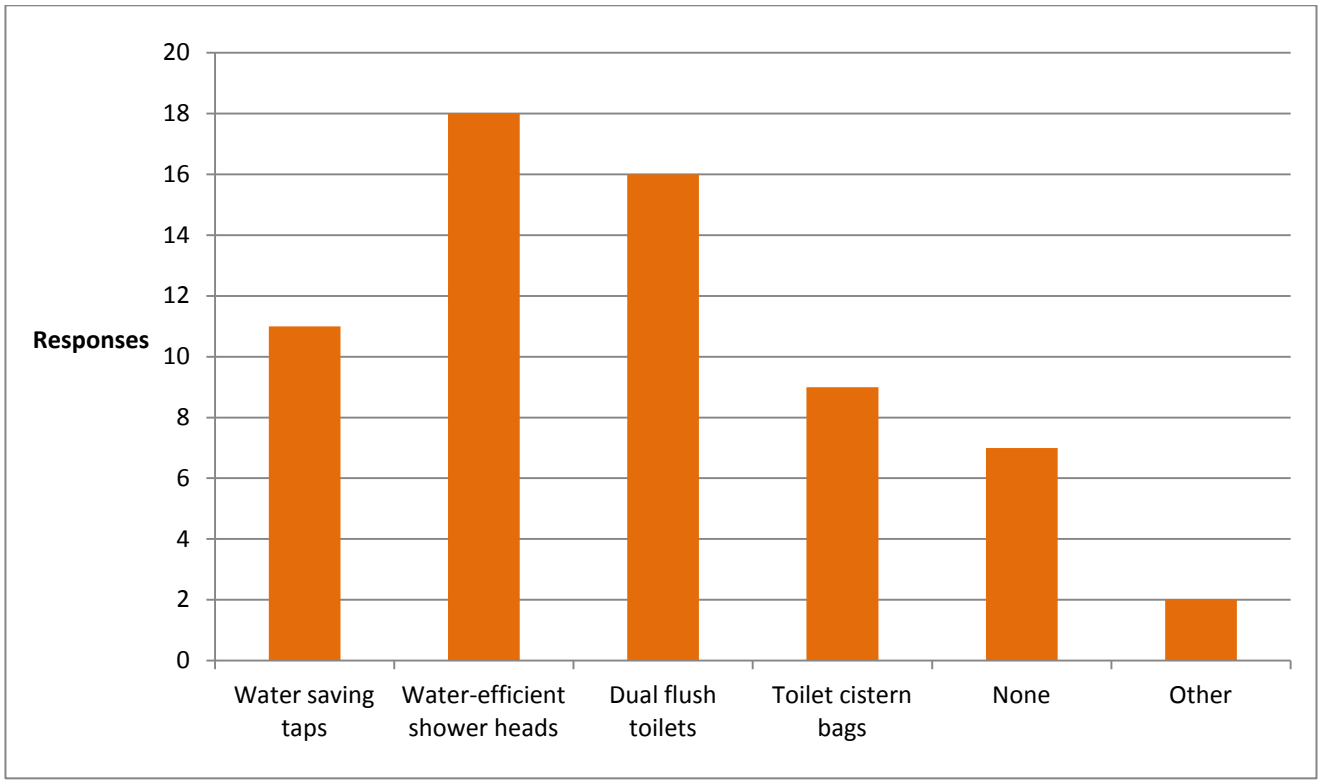

Figure 9 – Water saving devices installed at tourist accommodations

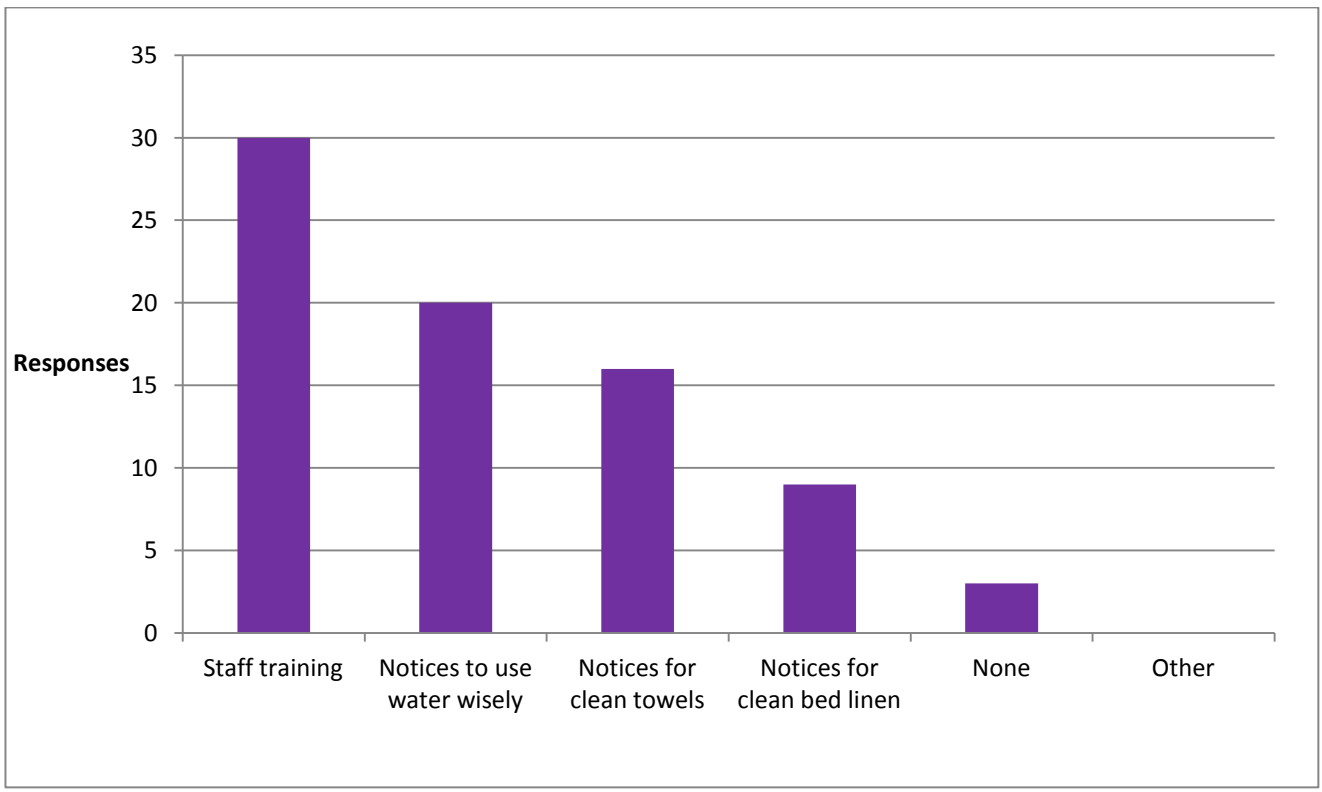

Figure 10 – Water saving habits adopted by tourist accommodation

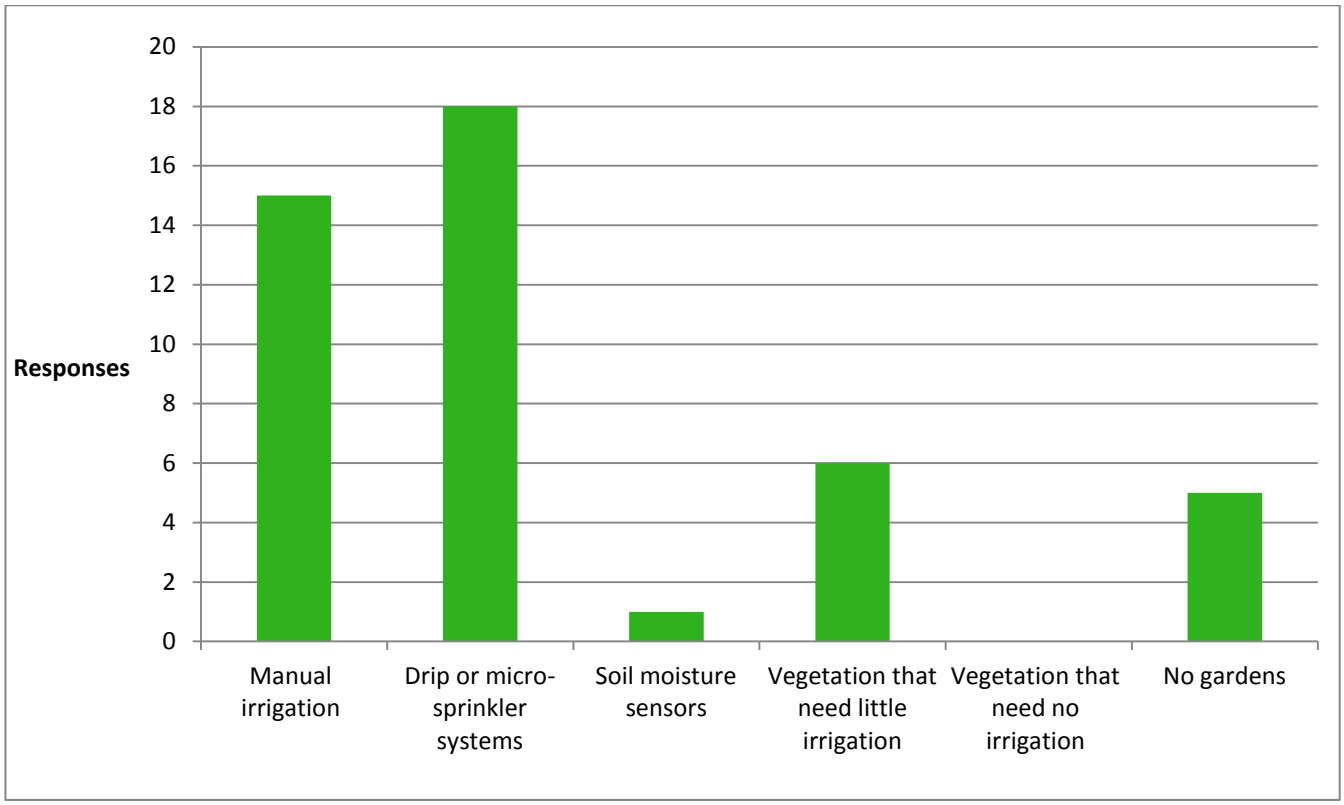

Figure 11 – Garden irrigation carried out in tourist accommodation

Respondents consider the main factors affecting tourist arrivals to be the economic and political situation of our times along with changes in destination trends and advertising campaigns, rather than extreme hot weather caused by climate change and droughts and water shortages (Figure 12). However, respondents do believe that general tourist arrivals as well as off-season arrivals will increase for the next 5-10 years or will not change at all (Figure 13). With regards to future plans that they have, most of them plan to encourage water savings habits (Figure 14). Many though do not have any future plans and none plan on installing an on-site desalination unit or go out of business.

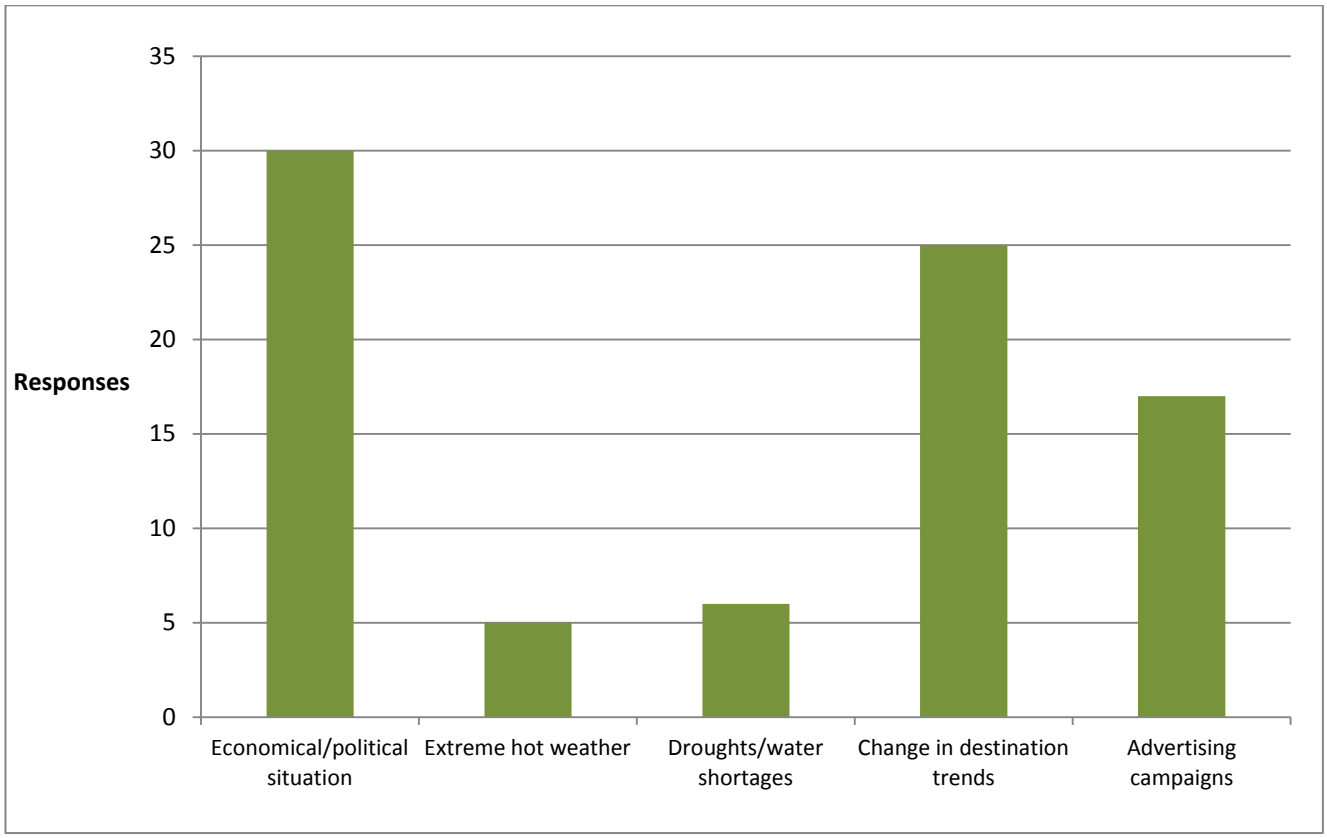

Figure 12 –Respondents response to factors affecting tourist arrivals

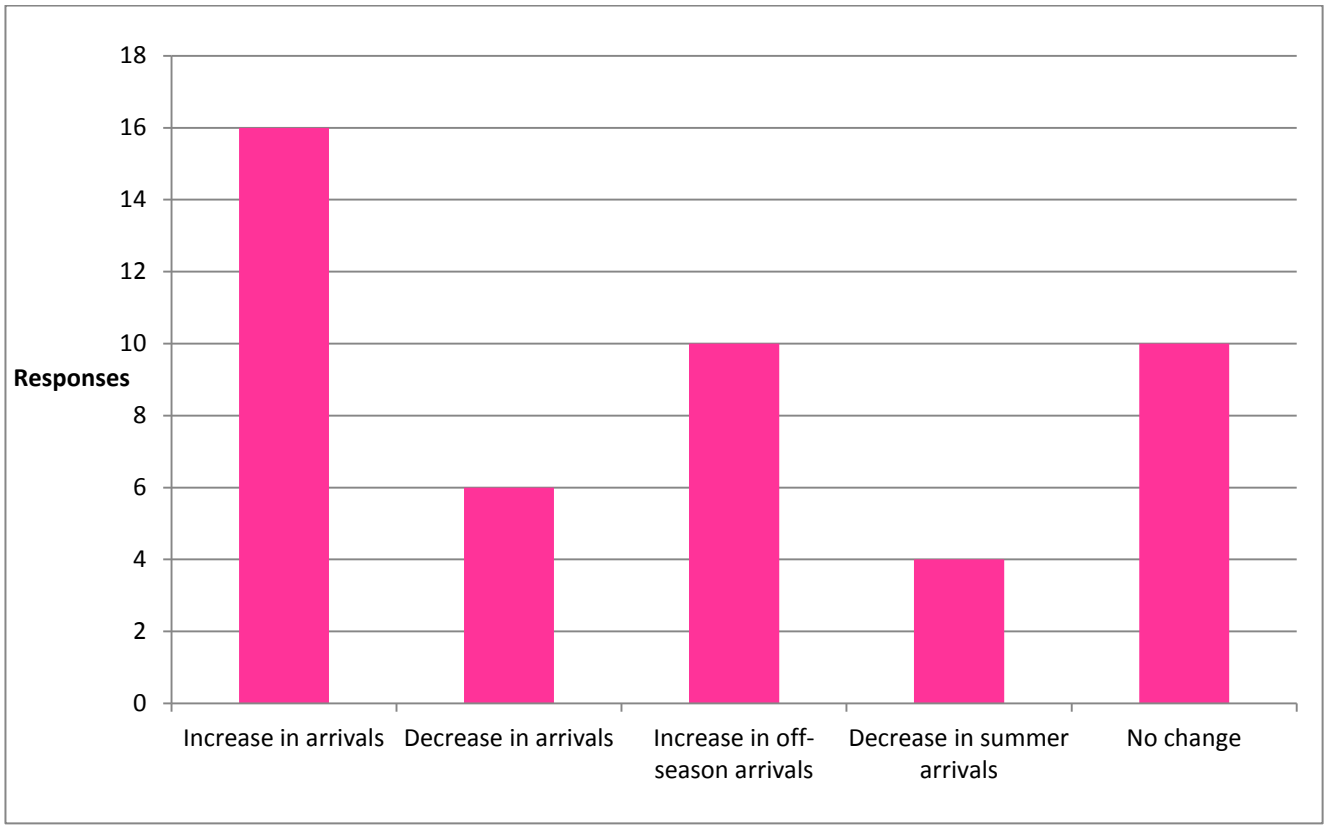

Figure 13 – Respondents projections on tourist arrivals in the coming 5-10 years

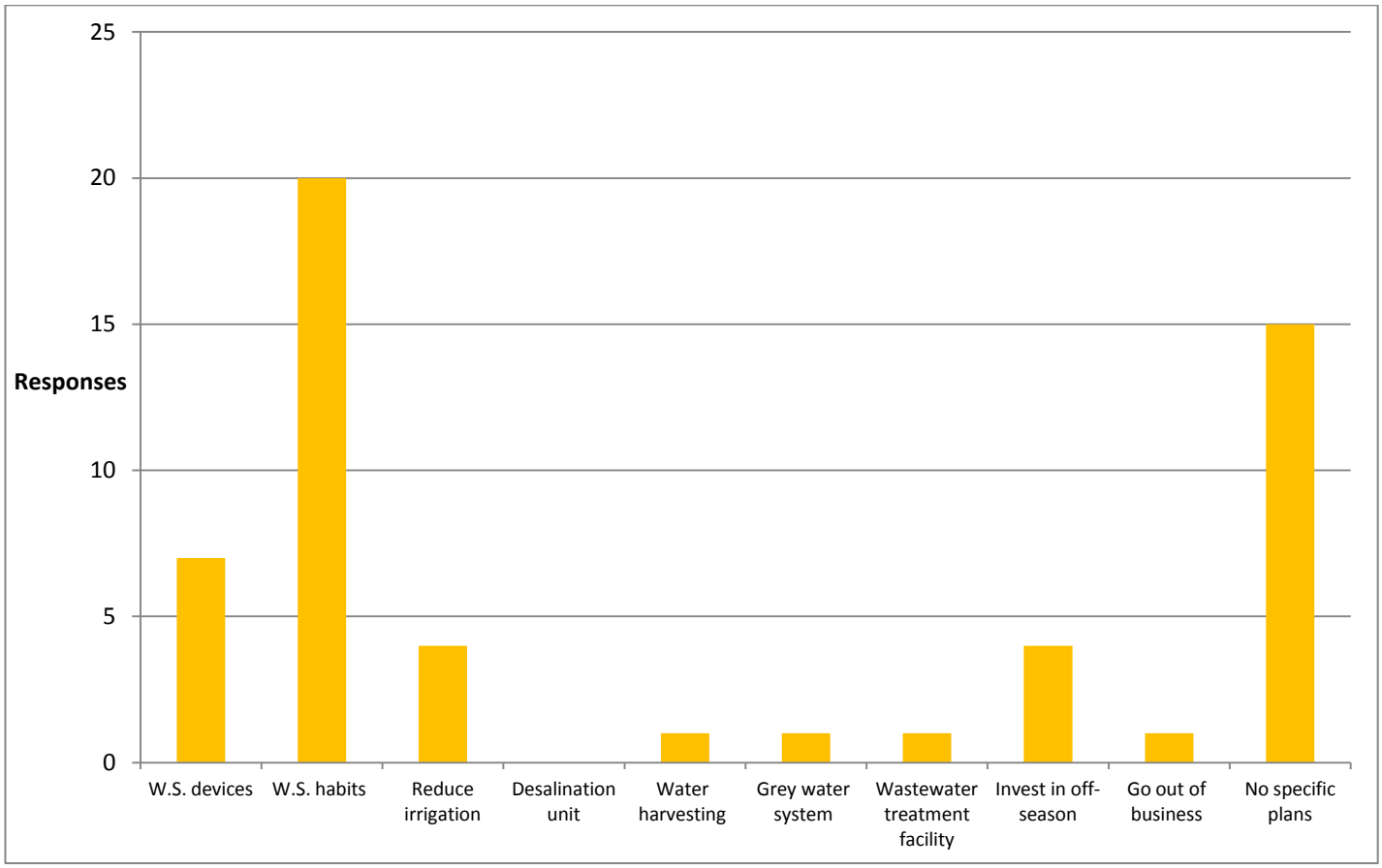

Figure 14 - Respondents plans for the coming few years

Summary

Water shortage has had an impact on the tourism sector as 28 out of the 36 tourist accommodations that replied to the questionnaire mentioned minor to major problems during drought periods of the last 15 years. Most hotels are applying measures to save water, however many do not have specific future plans. The tourism sector has a positive outlook on the future, considering that the majority of respondents do not expect a decrease in tourist numbers in the coming 5-10 years.

Acknowledgements

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Appendix 1. Hotel water use and supply questionnaire

This survey is part of a European research project on Climate Change, Hydro-conflicts and Human Security. The survey is managed by researchers from the Energy, Environment and Water Research Center of the Cyprus Institute (www.cyi.ac.cy). The survey contains 12 questions and will not take more than 10 minutes to answer. All survey entrees are anonymous.

1. Has your hotel suffered any water shortage problems during the past 15 years?
    a. Not at all
    b. Minor problems
    c. Business has been affected

2. Does your hotel have any of the following water saving devices?
   (Please select all that apply)
    a. Water saving taps
    b. Water-efficient shower heads
    c. Dual flush toilets
    d. Toilet water saving device (bags)
    e. None
    f. Other (Please specify)

3. Does your hotel encourage water saving habits?
   (Please select all that apply)
    a. Training staff to use water wisely
    b. Notices in bathrooms to encourage guests to use water wisely
    c. Notices in rooms for guests to indicate if they do not require clean towels
    d. Notices in rooms for guests to indicate if they do not require clean bed linen
    e. None
    f. Other (Please specify)

4. Do you believe that changes in the number of tourist arrivals are affected by:
   (Please select all that apply)
    a. The economical and/or political situation of our times
    b. Climate change causing extreme hot weather
    c. Droughts and water shortages
    d. A change in holiday destination trends
    e. Advertising campaigns

5. Does your hotel have access to its own water supply?
   (Please select all that apply)
    a. Groundwater from on-site borehole(s)
    b. On-site desalination unit
    c. Water collected from roofs (roof-top water harvesting)
    d. Grey water system for recycling water from wash basins and showers
    e. Water provided by commercial water tankers
    f. None

6. How does the hotel dispose of its wastewater?
   (Please select all that apply)
   a. Connected to sewerage network
   b. Discharge into cess-pits
   c. Operate an on-site treatment facility and discharge effluent to sea
   d. Operate an on-site treatment facility and use effluent for garden irrigation

7. How does the hotel keep its gardens green?
   (Please select all that apply)
   a. Manual irrigation by garden hose
   b. Drip or micro-sprinkler irrigation systems
   c. Irrigation system control with soil moisture sensors
   d. Drought tolerant vegetation that need little irrigation
   e. Drought tolerant vegetation that need no irrigation at all
   f. None, the hotel does not have gardens

8. What type of water do you use to fill the hotel swimming pool(s)
   (Please select all that apply)
   a. Potable water from potable water network
   b. Potable water provided by tankers
   c. Water from the hotel's own desalination unit
   d. Groundwater from an on-site borehole
   e. None, the hotel does not have pools

9. In the coming 5 to 10 years are you expecting:
   (Please select all that apply)
   a. A general increase in tourist arrivals
   b. A general decrease in tourist arrivals
   c. An increase in tourist arrivals during the off-season (fall, winter, spring)
   d. A decrease in tourist arrivals in summer
   e. No change

10. Have you made any plans for the coming few years to:
    (Please select all that apply)
    a. Install water saving devices
    b. Encourage water saving habits of staff and guests
    c. Reduce garden irrigation water use
    d. Install a desalination unit
    e. Install roof-top water harvesting systems
    f. Install a grey water system to recycle water from wash basins and showers
    g. Install a waste water treatment facility
    h. Invest in off-season business (fall, winter, spring)
    i. Go out of business (close down or sell the hotel)
    j. No specific plans

11. Where is your hotel located?
    a. In the coastal areas
    b. In the mountains or hilly areas
    c. Others (urban areas)

12. How many beds does your hotel have?
    a. between 1 and 20 (inclusive)
    b. between 21 and 50
    c. between 51 and 100
    d. between 101 and 200
    e. between 201 and 300
    f. more than 300

If you would like to receive the results of this survey, please enter your e-mail:
Survey entrees are not linked to your e-mail address and e-mail addresses will not be used for any other purposes. If you have any questions or comments, please contact us at: clico@cyi.ac.cy