Cuadernos de Turismo, nº 34, (2014); pp. 401-404 Universidad de Murcia
ISSN: 1139-7861

INCIDENCE OF DROUGHTS IN SENSITIVE TOURIST AREAS. THE CASE OF CUBA

Ana María Luque Gil
José Damián Ruiz Sinoga
Universidad de Málaga
geoana@uma.es, sinoga@uma.es

1. INTRODUCTION

It is argued that tourism, especially in island environments, is an economic activity that is sensitive to climate change (Becken, 2005; Belle and Bramwell, 2005; Uyarra et al, 2005; Méheux and Parker, 2006; Higham and Cohen, 2011). Nevertheless, until recently there have been few scientific or institutional studies in this research field, and hence important gaps remain in terms of the areas affected and the questions addressed. Most studies have focused on western countries (Koening and Abegg, 1997; Nicholls, 2006; Scott et al, 2006; Moreno and Amelung, 2009; Coombes and Jones, 2010; Martin, Steen and Lohman, 2011). These have assessed the vulnerability of tourism under various climate change scenarios, the adaptation of tourism operations to climate change (Scott, 2003), and the repercussions of the changes for temperature, sea level rise and extreme meteorological phenomena (such as cyclones).

However, issues such as water shortages and drought have largely not been addressed, despite evidence that climate change involves changes in rainfall patterns, with consequences for water availability and water supply to homes and tourist operations (Becken, 2005; Gössling, 2012). Among the major impacts of climate change on the tourism sector, many are directly linked to the dynamics of rainfall (UNWTO/UNEP, 2008), including an increase in the frequency and intensity of extreme storms, decreased precipitation, increased evaporation and flooding, all of which could affect tourism installations and infrastructure, water supplies and various natural and cultural resources (UNWTO/UNEP, 2008).

In this study we focused on coastal areas, as these have been identified as being more vulnerable to climate change and have not been the subject of detailed investigations (Moreno and Amelung, 2009; Moreno and Becken, 2009). The analysis was limited to the Caribbean region, an area especially sensitive to climate change, according to the International Panel of Climate Change. In this area, tourism activities have replaced traditional agricultural activity as the motor of economic growth (Padilla and McElroy, 2007). The

analysis focused specifically on the island of Cuba, which has become one of the region's major tourist destinations in the last 20 years. In the last decade the number of tourists visiting Cuba has doubled (reaching almost 2.5 million international tourists), and generated income of more than two billion dollars in 2009 (UNWTO, 2010).

In this study we addressed the latter issue through drought analysis. Droughts are extreme phenomena that are difficult to detect because they develop slowly, but have disastrous consequences for human communities and their economic activities, one of which is tourism.

The tool used to investigate the effects of drought cycles in the Caribbean was the Standardized Precipitation Index (SPI), and the series analyzed comprised data collected in Cuba from the middle of the 20th century to the present. The series were sufficiently complete for significant results to be obtained. The characteristics of the SPI enabled identification and categorization of rainfall anomalies, and analysis of their evolution. Thus, it was an important tool for understanding the incidence of such phenomena in the study area.

The initial hypotheses were based on assessment of recent rainfall dynamics in tourist areas. This is especially important for Cuba, because as an island it has an extraordinary dependence on rainfall to supply its water resources and it is a developing country with major infrastructure deficiencies. Therefore, the study aim was to establish the dynamics of droughts in the main tourist areas, as these are of major economic importance. Droughts were characterized and placed in the context of climate change.

2. SPATIO-TEMPORAL ANALYSIS OF THE DROUGHTS

Analysis of droughts at different time scales shows wide spatial variability and temporal dynamics, with no definite pattern and varying intensities, duration and frequency. However, given that Cuba is a long and narrow island, droughts affecting Cuba must be analyzed in line with this spatial variability.

2.1. Structural droughts

These correspond to SPI drought periods of 24 months (SPI24), a greater incidence of which was found in the central–western area, whereas few occurred in the south or the east. Their frequency followed no pattern, and while relatively severe droughts have been recorded at the central-western observatories in recent years, none occurred in the rest of the island.

With the exception of a very intense generalized structural drought episode that occurred in the central–western zone of the island between 2004 and 2006 (similar to those that occurred in the 1960s and 1970s), this kind of rainfall anomaly did not occur in the rest of the island.

2.2. Hydrological droughts

Hydrological droughts correspond to SPI drought periods of 12 months (SPI12). Analysis of the occurrence of these types of droughts indicated that they were highly random,

had high spatial and temporal variability and did not conform to a defined pattern. Thus, for this type of drought there was no pattern in the rainfall dynamics that would make us suspect the incidence of the climate change indicators posed by the Intergovernmental Panel of Climate Change.

Cuba's island nature and its longitudinal and latitudinal variation are factors that could influence the distribution of this kind of rainfall anomaly; and differences were found in both the intensity and occurrence of this drought type between the central–western observatories and those in the southern and eastern areas. These droughts affect the water supply for the population, but their main effect is on agriculture and stock.

2.3. Dry spells or seasonal droughts

These are droughts that correspond to SPI drought periods of 3 months (SPI3). Although these are the most common droughts and are the shortest ones, lesser consequences cannot be assumed. In the particular circumstances of the study area, the impact of such droughts on tourism operations may be very high and better planning, prevention and adaptation strategies are required. Although there was no definite pattern to their occurrence, dry spells or seasonal droughts were detected at all the observatories in the study, and in all the decades analyzed, indicating that this is a generalized rainfall anomaly in Cuba. In contrast to the low number and uneven distribution of droughts of other types (noted above), the mean number of extreme dry spells was greater and similar across the island (11 in the central–western zone and 9.6 in the east and the south).

Thus, though this is a low-intensity drought, given the orographic characteristics of Cuba's hydrological system, which prevents it building large reservoirs, it could become a drought with major consequences for an activity so dependent on water resources as tourism.

3. REPERCUSSIONS OF DROUGHT ON CUBA'S TOURIST INDUSTRY

3.1. Structural and hydrological droughts and tourism

These are droughts whose extension in time and space is less, but have greater economic and environmental repercussions, with increased competition for water between tourism and other economic sectors, particularly agriculture (Cabrera and Catasús, 2009).

3.2. Seasonal droughts and tourism

Dry spells have a direct impact on tourism operations. Cuba's island status, orography and length, the spatial extent of the dry spells, tourism's seasonality and deficiencies in water storage infrastructure or desalinization plants point to the possibility of dry spells causing major water conflicts. In consequence, the proliferation of this kind of drought may cause supply problems that affect the tourist industry.

To this problem of hydrological stress has to be added the low quality of the resources, due to the high pollution indices caused by domestic and industrial waste and by the

intrusion of salt water as underground catchments are over-exploited. Thus, it is likely that, as drought processes intensify, water crises will become more acute and the tourism industry will have to compete for water with other economic activities. This is a particularly worrying situation for those provinces, like the Eastern ones, that have suffered hydrological stress for several years.

In consequence, the strong pressure of tourist activity on the region is starting to create a whole series of water conflicts, which will grow in the coming years because of the tourism development program, which will soon increase sharply its hotel offer, and various other operations (theme parks, nautical buildings, seven golf courses, etc.). These projects are part of the policy to increase tourism infrastructure being developed by the MINTUR in recent years (MINTUR, unpublished).

4. CONCLUSIONS

1. Water resources are highly relevant and strategically important for hydrological planning, and because of their central role in many sectors of the economy, including tourism. Cuba's island nature, the characteristics of its mountains, and its social and economic circumstances make it directly dependent on rainfall.

2. Cuba's Caribbean and Atlantic tourist areas differ in terms of the distribution of rainfall anomalies; these differences are determined by the features of the island, and its longitudinal and latitudinal characteristics.

3. Long droughts, whether hydrological or structural, are rare. They predominantly occur in the central–western zone, and are extremely random and of great intensity. Since the droughts of the 1960s and 1970s, there has only been one rainfall anomaly, in 2004–2006. The east and south of the island have been largely unaffected by these processes, with only isolated episodes having occurred prior to the 1980s. These droughts affect the entire system, having eco-geomorphological, social and economic impacts (including impacts on tourism), and have highlighted deficiencies in water infrastructure.

4. Dry spells are of shorter duration, occur generally over the entire island, follow no definite pattern, and are much more common and intense. Their effect on tourism may be very high, given their seasonal character.

5. Application of the SPI to analysis of tourist areas is useful for detecting and characterizing dry periods. It should be used for establishing the duration of various stages of rainfall anomalies.

6. Further research is needed concerning other spatial and temporal drought conditions that could pose a greater threat to the sustainability of tourism, not only economically, but also in social and environmental terms.