Tourism at Costalegre, Mexico: An ecosystem services-based exploration of current challenges and alternative futures

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A R T I C L E   I N F O

Article history:
Available online 8 January 2015

Keywords:
Touristic ecosystem services
Ecosystem services stewards and beneficiaries
Scenario analysis
Environmental discrepancies and conflicts
Integrated social–ecological management

A B S T R A C T

Tourism, as all human activities, is dependent on the natural environment and its respective ecosystem services (ES). Different user groups manage and consume these touristic ES differently, resulting in discrepancies and potential conflicts. Despite the urgency to find inclusive local approaches for sustainable development, tourism studies still analyze socio-economic and ecological impacts separately and lack integrated social–ecological approaches to improve foresight in tourism planning. Based on a growing concern regarding the future of Costalegre on the Jalisco coast of Western Mexico, we analyze through interviews, surveys, and participant observation the dependence of tourism on specific ecosystem services and conduct a scenario analysis which shows present and future implications for the social–ecological system. Furthermore, this analysis shows in detail how different scenarios change ES provision and people’s livelihoods. Key findings include identifying freshwater provision and cultural ES as the most important touristic ES. At a regional scale, peasants in ejidos are the main ES stewards, whereas high-class tourism facilities constitute important local stewards. Benefits, mainly access to freshwater and the beach, are unequally distributed, provoking conflicts among different ES user groups that may escalate in the near future. Improved communication between all user groups and strengthening of key political actors seem to be the most immediate recommendations to ensure the long-term sustainability of this particular region. This work may contribute to improved planning and decision-making as our ES based scenarios are a first step to integrate social–ecological knowledge into improved decision-making. At a local scale, the study reveals the most likely future development options and their social and ecological consequences. It could also serve as a baseline for informed policy making.

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1. Introduction

Tourism is an expanding activity worldwide, both in terms of occupied space and as a growing market (Butler, 2013) having important implications on natural resources and locals’ livelihoods (Andereck, Valentine, Knopf, & Vogt, 2005; Gössling, 2002). Tourism’s dependence on natural resources and ecosystem services (ES) that are often shared with local inhabitants sometimes leads to actual social conflicts (Bieling, 2009; Jafari, 1982; Williams & Ponsford, 2009). While there is
no doubt about the urgent need to find local approaches to sustainable development (Hanspach et al., 2014) and while sustainable tourism per se is a popular research topic, tourism’s links to human well-being and long-term ecosystem maintenance remain undervalued within tourism research (Buckley, 2012; Gössling, 2002). Thus new means have to be found to improve well-sustained decision-making in order to deal with uncertainties (Christensen et al., 1996; Peterson et al., 2003). This paper highlights the present and future dependence of tourism on ES, using the Costalegre region in western Mexico as a particular case study. We examine current and future interactions between different ES users in the region to identify and analyze discrepancies, conflicts in the management of ecosystems, and access to ES. Different future options for the study area and their implications for ES provision and people’s livelihoods are revealed in a scenario analysis, that, without predicting, shows viable options for a region and can enhance people’s assessment of their futures (Peterson et al., 2003). In this regard, our research approach of ES based scenarios is a first step to integrate besides human and political preferences, ecological knowledge into tourism related planning for a specific site (Constanza, 2014; Raudsepp-Hearne et al., 2010). Our research questions were: (1) Which ES permit tourism? (2) Who are the different user groups and what is their role regarding ES management? (3) What are the perspectives of tourism stakeholders regarding ES? (4) How are ES benefits distributed? (5) How does tourism affect the long term provision of ES and the livelihoods of locals?

2. Conceptual framework

We draw on the concept of ES defined by the Ecosystem Millennium Assessment Initiative as ‘the benefits people obtain from ecosystems’ (MA, 2003, p. 53), using its categories of: (i) Supporting: services necessary for the existence of other services; referring to basic or intrinsic biological processes such as photosynthesis and atmospheric oxygen production, (ii) Provisioning: tangible goods such as wood or food, (iii) Regulating: benefits obtained from ecosystem processes, such as water purification or material recycling, and (iv) Cultural Services: nonmaterial benefits such as spiritual values and knowledge systems (De Groot, Wilson, & Boumans, 2002; MA, 2003). Provisioning services are the most tangible or visible whereas the others are generally less tangible and more difficult to perceive (Chan et al., 2012; Maass et al., 2005).

To examine interactions among the users, stakeholders and ecosystems, we use the typology of Swallow et al. (2009), who propose three actor groups: ES stewards, ES beneficiaries, and ES intermediaries. An ES steward is recognized as having the right to interact with an ecosystem, accepting limitations on those rights and obligations to maintain the ecosystem. ES beneficiaries are those individuals, families, towns and organizations, among others, who benefit from the services provided by an ecosystem, and ES intermediaries are entities that directly or indirectly shape interactions among ES stewards, ES beneficiaries and the ecosystem itself.

Although prediction is extremely difficult in social–ecological systems with high uncertainties, research needs to provide information contributing to decision-making in ecosystem management (Peterson et al., 2003). Therefore, we perform a scenario analysis to illustrate possible future directions for our study site (Duinker & Greig, 2007).

3. Study area

The area between Puerto Vallarta and Manzanillo on the Pacific coast of Mexico was officially decreed as a priority tourism area in 1990 under the name ‘Costalegre Ecological Tourism Corridor’ (DOF, 1990); considering tourism as ‘the impulse for regional development’ (Government of Jalisco & SEMARNAT, 1998). Fig. 1 shows the actual delimitation of Costalegre as the coastal strip of three municipalities: La Huerta, Tomatlán and Cabo Corrientes.

In this biologically diverse region (Ceballos & García, 1995; Challenger, 1998; Noguera, Vega, & Aldrete, 2002), important areas are still covered by well-conserved tropical dry forest (TDF) (Trejo & Dirzo, 2000). Its climate presents a strong seasonality; annual mean precipitation is 788 mm of which 80% falls in the period from June to October (García-Oliva, Camou, & Maass, 2002). In the coastal area with predominant TDF, nearly 90% of rainfall returns to the atmosphere (Burgos, 2004). The remainder is utilized by the ecosystem components; at the ecosystem level, water is the most important limiting factor (Maass et al., 2002, 2005). For human use, including tourism, water is consequently scarce (Maass & Burgos, 2011).

Costalegre’s biology has been extensively studied, essentially due to the presence of the Chamela Biological Research Station of the National Autonomous University of Mexico (UNAM; for its acronym in Spanish) and the Chamela-Cuixmala Biosphere Reserve (Ceballos, Szekely, García, Rodriguez, & Noguera, 1999), nevertheless social implications and site specific assets of the management of TDF still are less studied (Maass et al., 2005).

The population density in Costalegre is low; in the municipality La Huerta, for example, 11.8 habitants/km² with a growth rate of 2.6% (SIEG, 2010). From 1950 onwards, ejidos (institutions created after the 1910–1917 Mexican revolution for the collective use of lands) have represented the principal land tenure system, covering 70% of this municipality (César & Arnaiz, 2004). The main economic activities include agriculture, cattle ranching, fishing and forestry (Ortega, 1995). Tourism has also been considered in coastal development plans since the 1940s (Del Castillo, 1991); however, it has been growing slowly for more than seven decades. At present, La Huerta municipality hosts 50 tourism resorts with less than 1000 hotel rooms in total (Castillo et al., 2009). The development has been mainly in the hands of few European and Mexican entrepreneurs who own luxurious mansions, villas and a few hotels. In recent years, proposals for still exclusive but definitively larger tourism projects have spread and continue to do so, especially in the coast of La Huerta. In 2007, scientists from UNAM demonstrated the unsustainability of two projects and, at that time, were able to prevent their implementation (Castillo, Domínguez, García, Quesada, & Vega, 2007). However, one of these projects was resubmitted in 2010, rejected again by scientists and
conservationists (Boege et al., 2010), but finally approved by Mexican environmental authorities (SEMARNAT, 2010); current development plans include seven larger projects (FONATUR (Fondo Nacional de Fomento al Turismo), Government of Jalisco, & Secretaría de Turismo de Jalisco, 2011). These development plans (since 2002) in La Huerta, would increase the offer of rooms by at least 70% (author’s calculations). Considering the strong interest of both conservation and tourism lobbies in La Huerta municipality, this study analyses long term implications of these activities on the local social–ecological system and evaluates possible conflicts or synergies among them. Spatially, the study area concentrates Costalegre’s coastal ecosystems that are influenced by the watersheds of the rivers Purificación, Cuitzmala, and San Nicolás (see Fig. 2).

4. Research methods

The present analysis is based on scientific research conducted over more than 20 years in the municipality of La Huerta; in the last 15 years our group’s interest has been to understand rural livelihoods in the region. Identifying tourism as a recurrent factor in changing traditional economic activities and land use, we have applied our expert knowledge to the discussion of key findings. Where appropriate, we provide references to our previous work and include direct quotes from interviewees, as well as descriptions obtained through participant observation. In addition, data have been obtained over the last four years:

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Fig. 1. Study area location: La Huerta municipality within the Costalegre area on the Pacific coast of Mexico. Based on INEGI (2002) and DOF (1990). Digital data 1:50,000. Decimal degrees.
In 2010, a survey of 104 low and middle class tourists was conducted at public beaches during a school holiday break and in 2013, a total of eight semi-structured in-depth interviews were conducted with key informants and local leaders (municipality and federal government agents, owners of luxury developments). Substantial information was also obtained from analyzing documents (touristic projects and their respective environmental impact assessments; governmental environmental planning and conservation) and from fieldwork (repeated field trips [60 days in 2012/2013], participant observation, and photographic documentation). Sample determinations, observations, interviews, and surveys followed social research guidelines (Newing, 2011; Patton, 2002; Robson, 1994). The main topics covered perspectives of ES and issues related to environmental policies and tourism development on the Jalisco coast. Qualitative data from interviews were audio-recorded and transcribed for analysis.

The scenario exercise is both explorative and strategic (Börjeson, Höjer, Dreborg, Ekvall, & Finnveden, 2006), aiming to elucidate possible directions for the Costalegre region in the near future (10–50 years). It is based on our research expertise combined with recent direct data regarding tourism and from the analysis of new tourism proposals. To construct our scenarios, we analyzed tourism’s dependence on ES and combined then key ES together with other indicators. As an expert
team (Flyvbjerg, 2006), we discussed and determined specific trends based on the trajectory of the social–ecological system (Dearing, Braimoh, Reenberg, Turner, & Van der Leeuw, 2010) and also characterized possible effects on people’s livelihoods. Although the analysis is qualitative, we provide a final score of positive and negative effects to allow direct comparison between the scenarios.

5. Results

After giving a general overview of actual tourism development in Costalegre, our findings are presented following our research questions (see Section 1).

The current panorama of tourism facilities (2013) includes 53 establishments offering a total of at least 1047 rooms; this number has not changed significantly over the last ten years. Nevertheless, of the former exclusive hotels, only one (Las Alamandas) is still in operation. Club Mediterranée has been demolished, El Tecuán is abandoned, El Tamarindo and Hotel Careyes are temporarily closed. Besides the classic tourist establishments (hotels and villas), there are many high-end private houses and mansions for rent. In 2013, at least 55 luxury buildings for rent (in sites named Careyes, Cuixmala, and El Tamarindo) with their respective ‘infinity pools’, outdoor areas and a total of 170 bedrooms were counted (Delegación Costalegre, 2013; www.careyes.com; www.cuixmala.com; www.paralelo19.com). Prices ranged from US$320 (small beach house in off-season) up to US$16,500 per night for a seven-bedroom palace for the holiday season 2013. Corresponding real estate prices in Costa Careyes include US$330,000 for a condominium or US$5,000,000 to US$20,000,000 for a ‘luxurious beachfront villa’ (www.lapuntareality.com). Less exclusive private housing exists mainly in La Manzanilla village or in Pérula village with prices ranging from US$8 to US$40 per night.

5.1. ES permitting tourism

Table 1 shows the different ES permitting tourism at Costalegre. The order of the components and processes comprising the supporting ES on the left column follows the order of their importance to the prevailing ‘sun and beach’ tourism.

5.1.1. Cultural services

The esthetic appeal of the beaches, tranquility and recreation activities represent the main attractions of Costalegre. The Chamela-Cuixmala Biosphere Reserve constitutes a place for the fulfillment of scientific and educational interests. The Chamela Biological Research Station mainly provides educational opportunities through outreach activities: a yearly ‘Open Doors’ event and workshops at local schools and communities. La Manzanilla ejido runs a crocodile breeding program and offers educational tours for visitors. Some non-governmental organizations and foundations maintain turtle protection and bird watching activities (Fundación Ecológica de Cuixmala A.C., Fundación de la Costa de Jalisco, A.C., Fundación El Tamarindo A.C., Tierralegre A.C.).

5.1.2. Provision services

As explained in Section 3, precipitation is highly variable and concentrated over short periods of time and overall water is a scarce resource for human activities. Local towns, private houses, mansions and most tourism facilities on the coastal plain obtain freshwater from wells, whereas inland ejidos face difficulties and frequently need to transport this resource from distant places at high costs. Data collected in 2002 (Castillo et al., 2009) show that, of 31 tourism facilities, 21 used wells while the rest were connected to public water networks (which are also fed from wells). Freshwater is paid for differently in the study area; hotels obtaining water from wells are reported to only pay for the electricity required to pump the water; payments range from US$2 to US$9 per month. In 2013, however, a public well administrator reported selling 8000 l of water for US$45.

According to the Mexican Constitution, water is a resource owned by the whole nation; its extraction requires a concession from the National Water Commission (CNA, for its acronym in Spanish). For the municipality of La Huerta, from a total volume of a 24,234,777 m³ per year, more than 22 million m³ are used for agriculture, nearly 900 thousand m³ for urban or domestic uses in towns with a similar figure for services, which includes provision of water to business facilities such as shops or restaurants. The only registered hotel has permission to obtain 240 thousand m³/year, which is about a quarter of the total volume authorized in the urban or services categories (CNA, 2013). This hotel is highly exclusive, catering for a maximum of 34 guests with 20 resident workers on the premises, making a total of 54 people as water users.

Seafood is the most important food provisioning service. Hotels and restaurants are supplied mostly from local fishing cooperatives and smaller hotels buy meat and vegetables locally because it is easier and cheaper. Larger facilities buy these from outside the region, arguing they get better and more varied products. Wood from Parota (Enterolobium cyclocarpum), Bárchino (Cordia spp.) and Primavera (Tabebuia donnell-smithii) is used in tourism establishments for furniture and construction. Guayabillo (Pinanga mexicana) is used to build ‘palapas’ (open-air beach-front constructions), particularly important in Careyes style architecture where guayabillo and palm tree (Orbignya cohune) trunks with clinging ‘matapalo’ (Ficus spp.) are commonly used as ornamental columns. Moreover, local plants are used for ornaments and, according to data collected in 2002, three establishments (out of 32) exhibited parrots (Amazona finschi) (Castillo et al., 2009).
5.1.3. Regulation services

Freshwater quality is an extremely important regulation service. Several rivers drain into the Pacific Ocean in the Jalisco coast and, as shown in Fig. 2, three watersheds play a crucial role in water availability and quality in our study site. Since there is greater rainfall in the upper parts of these watersheds (Piña, 2007), the water drains through vegetation into soils and into the water table maintaining the permanence of rivers and provision of water to the coastal region. Riparian vegetation plays an important role in ensuring water quality, since it filters chemicals, influences water speed, prevents erosion and shapes the river bed (Kiley & Schneider, 2005). Thus, recreational activities such as swimming or fishing in coastal aquatic systems are possible (Flores-Diaz, Castillo, Sanchez-Matias, & Maass, 2014).
Microclimate regulation is another very important service. Due to the wind and sea currents, and because of its location, Costalegre has a warm climate with most rainfall associated with tropical hurricanes. The vegetation cover functions as a barrier, maintaining humidity and acts as a buffer for solar radiation and absorbing heat. Bare soil and rocks could not act as a buffer and thus alter the climate, becoming hotter, dryer and perhaps even more variable (García-Oliva et al., 2002).

Construction of hotels often leads to partial alteration or destruction of beaches, river lagoons, estuaries, mangrove forests, and river mouths. The consequences of destroying mangrove swamps are especially severe given their function as natural coast protection against hurricanes or tsunamis (Barbier et al., 2011). In La Huerta, the overall mangrove population recently increased slightly, but was negatively affected at specific sites (Del Castillo, 2014).

Natural biogeochemical processes decompose organic matter and human waste, treat wastewater, and recycle organic matter (Jaramillo, Martínez-Yrizar, & Sanford, 2011). Regarding tourism facilities, only one hotel has reported having a water treatment plant to separate solid residues and maintain compost (Castillo et al., 2009). Since the publication of that report then, ten more upper-level hotels separate their garbage and treat gray water.

The strong seasonality of the precipitation, along with the several highly erosive rain–storms that fall onto the convex rolling topography annually, make the soils in this zone particularly susceptible to soil erosion (García-Oliva, Maass, & Galicia, 1995; Maass, Jordan, & Sarukhán, 1988). Soil erosion control by the natural vegetation cover is therefore one of the most important regulation services in the study area. Soil formation, retention and fertility maintenance represent other important ES for productive activities (Maass et al., 2005), but are also important for tourism development because of their role in the long-term processes of sand and soil formation that create the sand beaches and soil available for the gardens of hotels and mansions.

5.2. User groups managing tourist ES

According to the typology proposed by Swallow et al. (2009), Figs. 3 and 4 present the different stakeholders of the identified ES. In Fig. 3, ES stewards and beneficiaries are presented in relation to each touristic ES. The criteria for the importance of each steward depend on the area of their land and location within the watersheds. As shown on the left side of the figure, the most important ES stewards are ejidos; they own 70% of the land in La Huerta municipality, which provides the highest number of ES. Their lands provide an esthetic landscape and play a role in all of the identified regulation services (see Table 1). Their role in water provision (quantity and quality available; processes closely related to groundwater renewal dynamics that occur at the watershed level) is of great importance. Federal lands, mainly water bodies and surface currents (rivers, streams which by law are considered federal zones) as well as Ramsar sites, play important roles in the regulation of ES and also provide aesthetic qualities. The hotels’ natural and built environments as well as the many protected nesting sites for sea turtles (Lepidochelys olivacea, Dermochelys coriacea, Eretmochelys imbricata and Chelonia mydas) (Ceballos et al., 1999; Garcia, Ceballos, & Adaya, 2003) are relatively smaller in size, but also provide cultural, provisioning and regulation ES.

The right side of Fig. 3 identifies the direct tourism related ES beneficiaries, recognizing on one side local inhabitants owning small hotels, hostels, trailer parks, and/or restaurant, on the other side, there are the high-end-hotels and luxury mansions for rent. In between these extremes exist small and medium sized facilities, that are not only smaller, but the owners usually live in the premises. In medium size and bigger premises, the owners frequently live outside the region.

Actors access differently to the benefits of ES (black dots denote access and gray dots denote restricted or no access). Cultural ES such as recreational opportunities and landscape esthetics provide benefits that are mostly used by luxury and medium size hotels, mansions and villas. Although small businesses also obtain these benefits, they do not represent an important monetary income. This aspect will be discussed in more detail in Section 6.1. When identifying ES, almost all stakeholders are benefit from freshwater access in quantity and quality. Most regulation ES deliver benefits at various spatial and temporal scales, and, in general, social groups cannot be excluded from obtaining these benefits.

Fig. 4 illustrates tourism’s embedding in different national and global interconnected geographical scales (Hall, 2008), following global markets and trends. ES intermediaries can thus be identified as agents that promote and permit these connections (Swallow et al., 2009). Examples of intermediaries at Costalegre are the municipality and its tourism department, the Costalegre tourism department, the Costalegre association of entrepreneurs, real estate agents and cooperatives, as well as federal and state tourism, environmental and social development ministries. Some of these users may act as stewards, intermediaries and beneficiaries at the same time (Swallow et al., 2009).

5.3. Perspectives of ES by tourism administrators, tourists and locals

Landscapes do not only have biophysical attributes; they are also subjected to and influenced by cultural perceptions; landscapes are created by people who give meaning to them (Bhattacharyya et al., 2005). Tourists visit Costalegre mainly for its isolated beaches (Castillo et al., 2009; Delegación Costalegre, 2011). In the survey conducted with 104 tourists, most (82%) people appreciated the beauty, cleanliness and tranquility of the beaches; they come to rest, swim and sunbathe. More than 60% of tourists have visited the site more than three times; 50% because of its beauty, more than 30% for the ‘tranquility of the beaches’ but only 10% considered the native vegetation an attraction. Nature is seen as conserved and a source of ES (85%) and visitors explained that increasing tourism facilities could have irreversible consequences, emphasizing water scarcity (83% of people), increased temperatures due to the lack of vegetation (80%) and extinction of local fauna (92%).
Ecosystem Service Stewards

- Hotels (natural and built environments)
- Owners of small properties
- Owners of lands adjacent to seas and coastal ecosystems
- Beaches, coastal and litoral ecosystems
- Municipality lands
- Sea turtle programs
- Fishermen cooperatives
- Remar sites
- Chamela-Cocula Biosphere Reserve

Fig. 3. Identification of ES stewards and beneficiaries related to touristic ES and illustration of different degrees of involvement in providing or receiving benefits. For ES stewards, dark dots denote greater and gray dots lesser involvement in the provision of ES. For beneficiaries, dark dots denote more to ES and gray dots less access. Regulation services marked with dots with an x provide benefits to all groups of society.

Participant observation and interviews with peasant families revealed that the local inhabitants also visit the beaches, rivers and wetlands for recreational activities such as swimming and fishing. Landscape appreciation and recreation are not only restricted to the beaches and sea. In inland ejidos such as Juan Gil Preciado, people enjoy the ‘monte’ (colloquial Spanish term in Mexico for forest vegetation such as TDF), particularly during the rainy season when ‘the green is beautiful’ (Cordero, 2005). People of several ejidos reported enjoying the shade and freshness provided by trees and finding peace and tranquility (Maass et al., 2005).

5.4. Benefit distribution of tourism related ES

Since stewardship in our case study is related to the control and management of specific areas of land, it is locally limited. Benefits, however, do not always follow this pattern; sometimes they are obtained at a distance. We therefore divide the reception of benefits into regional and local scales. In Fig. 5, we provide two examples of touristic ES that illustrate differences in the benefits obtained by particular stakeholders. In example A, ES such as water provision (including processes of groundwater renewal and water quality) are delivered from upper and middle parts of a watershed (where the stewards are mainly ejido owners) but are consumed in distant locations such as the coastal strip (by local communities and tourism businesses). In contrast, example B shows ES such as landscape esthetics or tranquility of the site (highly appreciated by tourists) that are provided and consumed at more local scales. The stewards are owners of ejido lands as well as private owners within the coastal strip.

5.5. Future scenarios: livelihoods and long term ES delivery

Four scenarios are shown in Table 2: (A) Massive tourism: based on Federal and Jalisco state interest in increasing tourism to maximize economic benefits as well as to alter the current image of Mexico in the world, big chain hotels and other
facilities are built; (B) More high-end tourism: led by powerful entrepreneurs (some living in the region), more luxury and highly exclusive tourism projects are approved; (C) Environmental conservation: following conservationist’s interest (particularly the Chamela-Cuixmala Biosphere Reserve), more land is exclusively dedicated to ecosystem conservation, extending existing natural reserves; new tourism projects as well as rural forms of land use are not permitted anymore; (D) Integrated Management: based on local initiatives seeking to promote the well-being of rural inhabitants as well as to support ecosystem’s conservation and restoration (The District Council of Rural Development discussed later in Section 6.2), stakeholders negotiate a balanced scenario comprising a mixture of tourism, primary production activities and natural protection.

While the last scenario (D) could easily be dismissed as too ideal, both scenarios B and C, provide more positive than negative effects, although there is an important difference between the two since the environmental conservation scenario (C) implies no positive effects for local communities. The high-end tourism scenario (B) has less positive effects on ES and a small positive effect for local inhabitants. Massive tourism (A) appears to be the most negative scenario.

6. Discussion

Table 1 in Section 5 showing the present dependence of tourism on ES for the Costalegre region in western Mexico was the basis to construct the scenario analysis (Table 2, same section) that anticipates future developments of ES delivery and their implications on the local social–ecological system. We now discuss selected topics and implications of our key results, and then reflect on limitations of our research approach.

6.1. ES stewardship: recognition and negotiation

There is a constant failure to acknowledge the dependence of human life on ES (Daily, 1997). Thus, making ES visible to society and particularly to those stakeholders directly related to decision-making processes (from local landowners to national and international agencies), remains an important task. Disseminating the notion that the manner in which we act has great impact on the life support systems of the Earth and provokes inequalities among people is still a considerable challenge. The expressed views on ES documented here must be shared and, moreover, the impacts (positive and negative) of tourism in the region should be not only the subject of discussion but also of negotiation.

Data show that local inhabitants recognize the recreational value of forests and rivers as well as the beauty and tranquility of beaches and rivers (Maass et al., 2005). However, the development of new tourism facilities is controversial. Some locals (peasants and fishermen, as well as hotel administrators) agree with the new developments and criticize the posture taken...
by UNAM scientists, arguing that the new projects will provide new and much needed employment in the region. Some sustain that the projects provide opportunities for selling “unattractive” inland properties, helping to sustain their families. Others are more aware of the negative impacts, particularly in relation to water availability: “we are not sure how the new constructions are affecting our wells”, “several hotel’s sewage are contaminating water bodies”. Regarding the closure of beaches for fishermen: “formerly, I owned a seafood restaurant on the beach, not anymore” and “I now have difficulties to access the beach and to move my merchandise”. Overall, more research is needed to better document the views of rural people to take their perspectives, values and needs into account (Williams & Ponsford, 2009) when planning and examining development projects in the region.

Intermediaries such as scientific institutions and governmental and citizen organizations should be much more proactive in communicating the strong dependence of human societies on ecosystems raising awareness in order to prevent their deterioration (Roux, Rogers, Biggs, Ashton, & Sergeant, 2006) and to promote participation in knowledge building (Hage, Leroy, & Petersen, 2010). If ejidos and private landowners would actively resume their role as main providers of ES, this could lead to conservation commitments or to negotiations with the new tourism entrepreneurs that are a key user group in transforming the social–ecological system at Costalegre. To be able to negotiate access to ES, all user groups must have access to relevant information. At Costalegre, scientific knowledge is constantly created but often not shared with non-scientists; very few initiatives exist aimed at mobilizing knowledge, such as those promoted by the Chamela Biological Research Station. Of great importance is the District Council of Rural Development formed by municipal agents, local stakeholders and the few scientists that participate in monthly workshops and meetings. On the other hand, the Chamela-Cuixmala Biosphere
Table 2
Four possible future scenarios in Costalegre. Symbols mean: ↗ increases, ↘ decreases, ≈ constant, + positive effect, – negative effect.

<table>
<thead>
<tr>
<th>Type of indicator</th>
<th>Indicator</th>
<th>Scenario A (massive tourism)</th>
<th>Scenario B (high-end tourism)</th>
<th>Scenario C (environmental conservation)</th>
<th>Scenario D (integrated ES management)</th>
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<td>Supporting ecosystem</td>
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<td>Spiritual, artistic, historical interests</td>
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<td>Other implications on local communities</td>
<td>Local jobs (directly and indirectly tourism related jobs)</td>
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<td></td>
<td>Agricultural activities (food crops and livestock)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Selling of lands</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Access to beaches</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fisheries</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Locals lifestyle changes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total score of effects</td>
<td></td>
<td>+ = 5</td>
<td>+ = 16</td>
<td>+ = 24</td>
<td>+ = 28</td>
</tr>
<tr>
<td></td>
<td></td>
<td>– = 34</td>
<td>– = 8</td>
<td>– = 16</td>
<td>– = 0</td>
</tr>
</tbody>
</table>

Reserve should accept its responsibility and act as an important mediating agent (Blauert & Zadec, 1999; Price, 2002) in order to facilitate the dialogue necessary between the different levels of government, the private tourism sector and the local communities.

6.2. Freshwater provision and cultural ES as main touristic ES: but who benefits?

As seen in Fig. 3 (Section 5), at a regional scale, peasants in ejidos are the main ES stewards, whereas high-class tourism facilities constitute important local stewards. Benefits, mainly access to freshwater and the beach, are unequally distributed, provoking conflicts among different ES user groups that have potential for future escalation. The most striking difference found is between peasants of ejidos, the main stewards of ES since they own the largest proportion of land in the study area, and the tourism businesses and residents who own and sometimes live on the coastal strip. The latter two obtain benefits that are transformed into monetary profits. Access to freshwater (availability in quantity and quality) by the tourism businesses is of most importance. Provision of this resource is strongly related to the presence of vegetation and the adequate functioning of the variety of ecosystems on ejido lands. Water access may therefore constitute the most unequally distributed ES, as illustrated by the following example: A mansion for rent advertises a swimming pool of one million liters (www.careyes.com); a volume that, although not directly consumed, would satisfy the water needs of a peasant with 40 head of cattle (considering rainy and dry season necessities) for a period of 21 months (Cohen, 2014). In terms of costs, the swimming pool owner pays US$1600 for that water (concession processing plus monthly payment; CNA, 2013), while the peasant pays US$7400 for the same amount. While coastal inhabitants with well access often pay only for the water pump electricity, cattle owners often pay for the water, the water pump and fuel for transport. It is even more astounding to note that a similar amount of water is the average consumed per day in US golf facilities (Barton, 2008). Regardless of the existing difficulties of the rural population in terms of obtaining freshwater in the study region (Castillo et al., 2009; Maass et al., 2005), prospective tourism developments are proposing golf courses surrounded by artificial lagoons on the coastal strip (Operadora Chamela, 2009), even pronouncing present environmental asymmetries (Zhou, 2004). To date, the problem of future freshwater provision remains unresolved, even though developers speculate about desalination of seawater or bringing the resource from other watersheds, which would surely entail unsustainable energy costs and alterations to ecological processes at different spatial scales (Einav, Harussi, & Perry, 2003; Zhou & Tol, 2005).
Beach access is another topic that has created actual conflict in Costalegre. While Mexican law states that owners of lands adjacent to a beach must leave a passage and allow access, this does only happen to a very limited amount at Costalegre. A recurrent argument used for restricting beach access is to ensure their cleanliness and for species protection (Garcia et al., 2003). Recent interviews (2012, 2013) with hotel administrators, tourism developers and municipality agents revealed an overall consensus of a ‘lack of culture’ in tourists and day excursionists that leads to serious contamination of beaches and water bodies, especially after main holiday periods (Easter week and Christmas/New Year’s Eve). However, closing the beaches means depriving locals from their right to enjoy beaches for recreational purposes and blocking access to working areas in the case of fishing cooperatives or small informal businesses or ambulant vendors. Of 36 public beaches in La Huerta municipality (Del Castillo, 2012), only five remained completely open to the public in 2013; some of the closing was conducted in the context of the new tourism projects.

It seems that the bigger question is whether different land uses in Costalegre could be made compatible (Budowski, 1976) and to which extent the protected area, sustainable productive activities and tourism are possible. Unlike other case studies that document unequal access to ES among different stakeholders, at Costalegre the strong conservation lobby forces adjustments which should offer opportunities to include long term ecosystem maintenance and sustainable livelihood for the local population.

6.3. Uncertain future: high-end tourism vs. conservation

Examining scenarios from Table 2 (Section 5.5), the environmental conservation scenario (C) based on the type of conservation notion that has prevailed in the study area, focused on increasing “pristine” landscapes (Pujadas & Castillo, 2007), seems to provide more positive effects on ES delivery but negatively affects the local communities, particularly in terms of their possibility to continue working as peasants or fishermen. Interestingly, benefits vary depending on the type of tourism (A and B), with high-end tourism having the most balanced outcome, after the idealized scenario (D). An effort to secure water availability and fishing activities allowing access to beaches remains an important challenge for the tourism business. Scenario C has also to be confronted with the question of how to promote among local inhabitants the need to safeguard biodiversity and ecosystem functions (Gössling, 1999).

Results show that freshwater availability is the main ES at risk when increasing tourism in Costalegre. Ecosystem functioning has evolved in accordance with precipitation fluctuations, which are highly variable (Garcia-Oliva et al., 2002). This makes water a limiting factor for ecosystems and a scarce resource for the human population. There is no information regarding a threshold that could provoke an irreversible shift that would not allow the ecosystem to respond and thus conserve its essential properties (Walker et al., 2006). While the water cycle functions at larger scales, such as that of the whole watershed, a threshold may exist for the coastal ecosystems. Water is extracted from wells near the coastline and, if extraction continues to increase, seawater intrusion may occur in these wells. This could diminish and even stop access to freshwater, altering and even destroying coastal ecosystems such as mangroves. Despite uncertainty, humans are capable of foresight, and can learn and act in order to manage resilience (Walker et al., 2006). Often in tourism settings, local elites with high economic or political power shape decision-making (Hall, 2011) which happens at Costalegre (Ávila-García & Sánchez-Luna, 2012). The presence of the Chamela-Cuixmala Biosphere Reserve, however, has been able to put limits to new tourism projects (Boege et al., 2010). Voices of locals, however, are still very much underrepresented (Brenner & Aguilar-García, 2002) making it urgent to advance in systematizing local views and their forms of living, facilitating the necessary step for them to be able to participate in obtaining tourism’s benefits (Andereck et al., 2005).

6.4. Constructing alternative futures

Providing information and enhancing communication among the stakeholders of Costalegre is essential, but organizational and institutional shifts are required as well to find new forms of managing ES. Collective management could align stakeholder activities through autonomous agents (Muradian, 2013). Existing social organizations, such as the District Council of Rural Development, and its citizen’s association mentioned in Section 6.2, seem to be key political actors and a suitable platform from which exchanges of information, views and proposals can take place. To involve tourism associations, as well as scientists, conservationists and other relevant local, state and federal governmental agencies is crucial in order to set common goals. When aligned to other productive activities and development goals, tourism can be conceived as a positive factor bringing benefits to local communities (Holden, 2008), without negatively affecting landscapes and ecosystems.

To compensate for the unequal benefit distribution, mechanisms such as payments for ES have been suggested. At present, three ejidos located near the Biosphere Reserve receive governmental payments for ES and are encouraging others to do likewise. While it is still not clear whether monetary stimuli work in the long term, schemes have to be designed and implemented according to particular settings and contexts (Muradian, 2013). In our case study, water provision is and will only be guaranteed by the existence of vegetated lands in middle and upper parts of watersheds. The owners of these lands, however, do not fully recognize this situation and thus do not demand rewards. Direct monetary payments related to tourism are only known in the form of selling land with direct beach access. Conflicts over water and beach access already occur in Costalegre and can easily escalate; it is therefore urgent to construct agreements through participatory actions within an integrated ES management approach in order to guarantee the long-term maintenance of the Costalegre
social–ecological system. Here, ES based scenarios could be seen as a first step to integrate ecological knowledge and social preferences into planning for a specific site (Constanza, 2014; Raudsepp-Hearne et al., 2010).

6.5. Limitations of research approach

Case studies are well suited to generate context-specific social knowledge and expertise (Flyvbjerg, 2006). Overall generalizations, however, are not possible but restricted to a geographically defined area (Yin, 2011). Several of the conditions examined in our case study, nevertheless, are present in Mexico and other Latin American contexts where tourism is seen at present as a relevant economic activity to be promoted and supported by governments. Its relationship with natural ecosystems is therefore an essential issue that needs to be taken into account.

The concepts of ES (Daily, 1997; MA, 2003) and their user groups (Swallow et al., 2009) have allowed us to identify the specific connections between different actors and their interaction with ecosystems. Their respective simplicity has also been useful in terms of understanding tourism in Costalegre and, particularly, to examine the roles played by the different actors. Despite its worldwide attention from academics and practitioners (Fisher, Turner, & Morling, 2009), its applicability is still under debate because of unresolved questions such as: “why does human well-being increase while ES decrease?” (Raudsepp-Hearne et al., 2010).

Our scenario analysis, when applied to planning, can be a first step to discuss and develop joined strategies regarding how to achieve desired goals (Peterson et al., 2003). Although it is based on expertise and context-dependent knowledge (Flyvbjerg, 2006), it provides a synopsis and an illustration of possible futures; further benefits could be achieved when practiced in a fully participatory manner with relevant stakeholders.

7. Conclusion and outlook

Governmental plans and the growing list of tourism infrastructure proposals anticipate tourism to be the booster of further economic and social development in Costalegre (Government of Jalisco, 2012). However, we have shown that currently not all user groups benefit equally, neither from present ES nor from ES based tourism. Future developments could render these environmental and social discrepancies more or less severe. This is why we have forecast probable implications for the most likely forms of future development and their specific implications on ES delivery, not only for tourism but for the general social–ecological system.

In this regard, the paper is an invitation to improve dialogue among stakeholders and to jointly construct viable futures to preserve the Costalegre social–ecological system in the long-term (Hanspach et al., 2014). The scenario analysis based on the ecological examination of ES might serve as a baseline to develop scenarios in a participative way to include relevant stakeholder groups more actively.

Acknowledgements

The paper constitutes a partial fulfillment of the Graduate Program in Biological Science of the National Autonomous University of Mexico for the first author who also acknowledges the PhD scholarship received from CONACYT, Mexico. Funding was obtained from CONACyT (Investigación Científica Básica 83441) and Programa de Apoyo a Proyectos de Investigación e Innovación Tecnológica UNAM (PAPIIT: IN300813-RN300813).

We are very grateful to the many people of the Jalisco coast who shared their views and provided us with valuable information and also thank the Chamela Biological Research Station of UNAM and acknowledge the technical support received from David Gonzalez Jiménez, Lucía Martínez, and Paola Arreola, as well as the English editing of Keith MacMillan. We thank the editor and two anonymous reviewers for their useful suggestions and observations to improve the quality of this paper.

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