

Marine ecotourism in the Gulf of California and the Baja California Peninsula: Research trends and information gaps

Andrew F. Johnson, Claire Gonzales, Amanda Townsel, Andrés M. Cisneros-Montemayor

Supplementary material

Table S1. – Search terms used to describe the published literature related to marine ecotourism in Baja California. x denotes use in the search.

Search term	Number of search																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Marine	x	x	x	x			x		x	x													
Ecotourism		x	x		x																		
Tourism	x			x		x					x	x	x	x	x	x	x	x	x	x	x	x	x
Industry	x						x		x														
Baja California		x						x		x	x	x	x	x	x	x	x	x	x	x	x	x	x
Mexico	x	x	x	x	x	x	x		x		x	x											
Holiday				x																			
Vacation		x						x															
Recreation							x			x													
Economy					x				x														
Infrastructure							x																
Employment										x													
Environment			x						x														
Eco				x																			
Nature								x		x													
Diving											x												
Snorkelling												x											
Whale watching													x										
Shark watching														x									
Beach															x								
Kayak																x							
Sailing																	x						
Cruise																		x					
Fishing																			x				
Angling																				x			
Wildlife																					x		
National park																						x	
Protected area																							x
Total unique	7	2	1	0	0	2	1	1	0	7	0	2	4	1	2	5	0	1	1	2	1	3	3
For review	7	9	10	10	10	12	14	15	15	22	22	24	28	29	31	36	36	37	38	40	41	44	47

Table S2. – Table of the 47 publications identified and reviewed.

Year	Title	1 st author	Publication	General result / conclusion
2012	Diagnostico y perspectivas del turismo alternativo en Todos Santos, Baja California Sur.	Acevedo	Auto. Uni. Baja California Sur	Development of the ecotourism sector must involve the inclusion of the local communities and all stakeholders must be involved with future management designs.
2014	Proyecto de sustentabilidad ecoturística en el parque nacional Cabo Pulmo; análisis de los servicios ecosistémicos para la implementación de actividades económicas turísticas	Aguilar	Auto. Uni. Baja California Sur	Development of ecotourism in Cabo Pulmo must primarily be sustainable, giving priority to the environmental services of the local area, then the economy of the tourism industries in the area.
1999	Conservation and management-oriented ecological research in the coastal zone of Baja California, Mexico	Anamaria	J. of Coastal Conserv.	Destruction of dunes will have huge consequences for bird populations and use of this resource into the future.
1976	Seabirds in the Gulf of California: a vulnerable, international resource	Anderson	Nat. Res. J.	Conservation of birds needs prioritizing over development, as once populations are impacted it is hard to restore them to natural levels.
2004	El turismo como alternativa a la pesca en el manejo de un arrecife coralino. Caso Cabo Pulmo, Golfo de California.	Arizpe	Auto. Uni. Baja California Sur	The conversion from fishing to diving operations in Cabo Pulmo has actually afforded greater economic returns to the local population of the village.
2014	Geodiversidad y paisaje: un análisis de su potencial en Baja California, México	Ayala	Invest. Geograficas	The idea of geoparks and their scale means practical conservation units and the involvement of many sectors for their conservation and all ecosystem services within each area.
2009	Investigating the potential for marine resource protection through environmental service markets: an exploratory study from La Paz, Mexico	Barr	Ocean and Coast. Management	Compensation (60 USD per week) outweighed willingness to pay by tourism sector.
2000	Spatial journeys: eco-tourism in the lower delta region of the Colorado river and the upper Gulf of California.	Clement	Uni of Arizona	Preservation through tourism that involves locals is the key to management of the area.
2014	Educación ambiental para prestadores de servicios turísticos vinculados al avistamiento de cetáceos en Puerto Adolfo López Mateos, municipio de Comondú, Baja California Sur (BCS)	Colin	Auto. Uni. Baja California Sur	Tourists in general would benefit from more environmental information for the sightseeing they are undertaking. This will have wider-reaching benefits in terms of stakeholder education and environmental awareness.
2009	Impactos del turismo en las comunidades pesqueras de la Bahía de Banderas, Nayari-Jalisco.	Dagostino	Acta Pesquera	Livelihood and satisfaction of fishermen was greater in years gone by but the opinion of ecotourism is good and fishermen expect that it will help low economic returns experienced in recent years in the fishing industry locally.
2002	The impact of international tourism on community-based development in Baja California Sur, Mexico.	Doloutskaia	Duke University	Communities need to clearly define their development goals, and in many cases it is beneficial to enlist the help of NGOs to study the present systems and provide recommendations for development.
2007	Property rights-based management: whale shark ecotourism in Bahía de Los Angeles, Mexico	Dowdell	Fisheries Research	The best option for the area is a concession in favour of the local users.
2003	Tourism-based revenue generation mechanisms	Drumm	World Parks Congress	Protected areas need income generation strategies including visitor fees.
2008	The imprints of tourism in Puerto Vallarta Jalisco, Mexico	Everitt	The Canadian Geographer	Economic change must come with environmental sustainability if the growth is to be sustainable.
2013	The impact of vessel crowding on the probability of tourists returning to whale watching in Banderas Bay, Mexico	Foucat	Ocean and Coast. Man.	Crowding in operations negatively affects the likelihood of returning to the area for tourists and most tourists agreed that a maximum number of boats for a trip was two.
2006	Some biological aspects of blue marlin (Makaira nigricans) in the recreational fishery at Cabo San Lucas, Baja California Sur, Mexico	Garcia	Bull. Mar. Sci.	Higher sea surface temperatures mean better catch for the sports fishers, and few reproductively active females were caught in the fishery.
2013	Economic analysis of the tourism and its impacts in the ecosystems services for the coastal area in Baja California Sur	Garcia	J. Bus. and Econ.	Housing and tourism developments have caused significant changes in ecosystem services in the area.
2001	Management priorities for Magdalena Bay, Baja California, Mexico	Hastings	J. Coast. Conserv.	Conflicts exist in Bahía Magdalena between stakeholder groups related to management priorities.

Table S2 (Cont.). – Table of the 47 publications identified and reviewed.

Year	Title	1 st author	Publication	General result / conclusion
2001	The influence of whalewatching on the behaviour of migrating gray whales (<i>Eschrichtius robustus</i>) in Todos Santos bay and surrounding waters, Baja California, Mexico	Heckel	J. Cet. Res. and Man.	Whale behaviour did not change during the southbound migration but did alter during the northbound migration.
2003	Issue definition and planning for whale watching management strategies in Ensenada, Mexico	Heckel	Coast. Manag.	Mexican whale-watching law is insufficient and self-regulation and law enforcement needs addressing so that migration corridors are not pushed offshore in the long-term.
2008	Servicios turísticos – Bahía de Los Angeles: recursos naturales y comunidad;	Danneman	Línea base 2007	Environmental protection must come before the economic development of Bahía de Los Angeles.
2003	Influencia del turismo sobre la conducta del lobo marino de california <i>Zalophus californianus</i> en la lobera los islotes, BCS, México.	Martagon	Centro Interdisciplinario de Ciencias Marinas (CICMAR)	25% of disturbances to the sea lion colony are directly caused by human interaction with the sea lions. There are no signs of habituation of the sea lions to the humans visiting the area.
2014	Servicios ecosistémicos con potencial turístico del parque nacional archipiélago Espíritu Santo, México	Martinez	Teoría y Praxis	The same restrictions should apply to sport fishing as they do to artisanal fishing, and more policing of the local waters is needed to ensure rules are followed by all stakeholder groups.
2014	Ecosystem services and their impact on poverty and inequality in coastal communities of Baja California Sur	Monroy	Int. J. Sust. Dev. and Plan.	Smaller communities dependent on ecosystem services had a higher poverty level, while ecosystems had a positive effect on improving the distribution of wealth.
2007	The economic benefits of ecosystem-based marine recreation: implications for management and policy	Montemayor	Auto. Uni. Baja California Sur	The effects of ecosystem dynamics in an already overfished system must not be overlooked, as they can hinder or even reverse desired management outcomes.
2012	Ecosystem models for management advice: an analysis of recreational and commercial fisheries policies in Baja California Sur, Mexico	Montemayor	Ecological Modelling	The effects of ecosystem dynamics in an already overfished system must not be overlooked, as they can hinder or even reverse desired management outcomes.
2002	Evaluating ecotourism in natural protected areas of La Paz bay, Baja California Sur, Mexico: ecotourism or nature-based tourism?	Monteros	Biod. and Conserv.	The majority of operators classified as ecotourism operators were found to be benefiting conservation locally in some way, but costs are not comparable to those required to conserve the protected areas of the region.
2014	La huella de carbono de la observación de ballena jorobada (<i>Megaptera novaeangliae</i>) en las Islas Marietas, Nayarit, México	Ortega	Rev. Int Contam. Amb.	Per passenger carbon footprints of the whale watching operations in Islas Marietas are above the global average.
2000	El ecoturismo, una nueva modalidad del turismo de masas	Rabago	Rev. Int Contam. Amb.	In order for ecotourism to develop to its full potential, it is essential to have local communities involved at all stages of its development.
2013	Impact of climate change on sustainable management of Gray whale (<i>Eschrichtius robustus</i>) populations: whale-watching and conservation	Salvadeo	Arch. Bto. Sci.	Climate change is good for calf production in terms of numbers but bad in terms of the new areas that will eventually become new whale watching grounds where the whales will face new threats.
2007	A social relational approach to the conservation and management of fisheries: the rural communities of the Loreto bay national marine park, BCS, Mexico	Sanchez	Simon Fraser University	Cultural values and tradition are deeply embedded in fishing communities and information sharing is prevalent within communities but not as widespread between communities.
2003	The influence of social capital on the development of nature tourism: a case study from Bahía Magdalena, Mexico	Sawatsky	Uni of Toronto	Significant differences in the types of social capital can explain the structure of ecotourism operations in Bahía Magdalena.
2014	How do small-scale fishers adapt to environmental variability? Lessons from Baja California, Sur, Mexico	Sievanen	Mar. Stud.	Fishers have become more concerned with environmental variability and fluctuations in catch, but tourism development may give them an adaptation strategy which can mitigate reductions in earnings due to catch fluctuations.
2009	Management of a marine protected area for sustainability and conflict resolution: lessons from Loreto bay national park (Baja California Sur, Mexico)	Stamieszkin	Ocean and Coast. Man.	Management needs to be based on ecosystem science, and good communication between all stakeholders is essential to ensure shared co-management of the area.

Table S2 (Cont.) – Table of the 47 publications identified and reviewed.

Year	Title	1 st author	Publication	General result / conclusion
1997	Human perturbations and conservation strategies for San Pedro Mártir island, Islas del Golfo de California reserve, México	Tershy	Environmental Conservation	Commercial fishers are responsible for more of the disturbances to the natural systems than tour operators, who follow their own guidelines to ensure minimal disturbance to the animals.
1999	A survey of ecotourism on islands in northwestern México	Tershy	Environmental Conservation	Neither government regulations nor cost of trips are important impediments to ecotour operators in the Northern Gulf of California.
2007	Community-based management through ecotourism in Bahía de Los Angeles, Mexico	Torres	Fisheries Research	Human interactions with the whale sharks may lead to negative impacts for both the sharks and the tourist industry relying on them. This paper led to the generation of a “code of conduct” for whale shark tourism operations.
2011	Economic benefits of recreational services provided by the aquatic biodiversity of the national park archipelago Espíritu Santo	Trejo	Nat. Auto. Uni. of Mexico	Foreign visitors perceive a greater benefit of local biodiversity conservation than local tourists and are willing to pay more to conserve it.
1999	Balancing conservation with development in small-scale fisheries: is ecotourism an empty promise?	Young	Human Ecol.	Secure local access rights and mobilization of nascent community-based organization could help develop the ecotourism industry in Baja California significantly.
2011	Maestría en ingeniería civil planeación territorial “planeación para el desarrollo regional sustentable con la incorporación del turismo en el corredor costero San Felipe – San Luis Gonzaga, Baja California, México (1988-2008).”	Zavala	Inst. Poli. Nac.	Infrastructure is the primary consideration in building tourism in the area of San Felipe and adjacent tourism corridors.
1994	Evaluating ecotourism in Mexico’s biosphere reserves: whale watching activities in the world heritage site of Laguna San Ignacio, Baja California Sur, Mexico 1994-2002	Agerter	Uni. Baja California	Stakeholders would benefit from evaluating their current costs and considering technological investment (boat engines) as well as the wider spread use of the internet to promote their businesses.
2009	Establishing a socio-economic baseline of sea turtle ecotourism in Baja California Sur, Mexico	Finkbeiner	Duke Uni.	Perceptions of ecotourism are optimistic, although current participation is low, and in some areas infrastructure is lacking for current development of the industry.
2008	Sustainability and balanced ecotourism management: lessons from whale watching in Laguna San Ignacio, Baja California Sur, Mexico	Chong	Uni of Ontario	Future research should look at developing new ecotourism strategies as well as using St Ignacio as a case study on which to build other ecotourism opportunities in Mexico.
2010	Sustainable tourism planning for the only coral reef in the Gulf of California: Cabo Pulmo national park	Arizpe	Sust. Tour. IV	The quality of life has improved greatly since the protection of the area. High-impact sites need close future management observation to ensure the sustainability of the developments in the area.
2011	An alternative tourism model for sustainable development in Los Cabos, Baja California Sur, Mexico	Arizpe	Ecosyst. Sust. Dev. VIII	Los Cabos has inadequate development plans. Steps need to be taken to ensure that mass tourism does not overtake ecotourism in the area and in BCS in general.
2007	Traditional and alternative tourism in Loreto	Gámez	Loreto, The future of the first capital of the Californias	Continued development of Cabo Pulmo must account for the ecological integrity of the reefs on which the tourism is based and its development must involve the participation of all stakeholder groups.
2012	Sustainability and the traditional tourism model in Baja California Sur, Mexico	Ganster	Sust. Tour. V	The development of tourism in Baja California presents a clear threat to the ecosystems in the area. Future management considerations must foremost consider the environment, then the industrial development of BCS.