Table S1. Sustainability and circularity indicators for tourism - findings of the three literature reviews

Ref.	Authors	Sustainability Indicators/indices			Life cycle orientation	Comments
		Environmental pillar	**Economic pillar**	**Social pillar**		
A) Meta review sustainable tourism assessment						
40	Schianetz et al., 2007	(i) pressure or stress indicator (Pressures caused by human activities that affect environment, culture and economy, e.g., Water shortages or crime indices) [79,80]; (ii) state indicator (Current state of the industry, e.g., Number of local people employed by the tourism industry) [79]; (iii) response indicator (The response of society and management efforts to solve problems identified by other indicators (e.g., stress, pressure and state), e.g., Introduction of taxes, cleanup costs for coastal contamination) [79]; (iv) impact indicator (Impacts on the social and economic functions of the tourism destination, e.g., Loss of biodiversity, changes of income levels of local communities) [81]; (v) performance (The performance (distance to target) of the industry, e.g., Waste generated/ waste target) [81]; (vi) efficiency (The efficiency of human activities to resolve identified problems (comparison of gain and expenditure), e.g., Energy-efficiency of cars, buildings) [81]; (vii) early warning indicator (Observable changes that could affect the sustainability of the industry, e.g., Decline in tourists who intend to return) [13].			Not mentioned	Focus on Destination
10	Torres-Delgado and Saarinen, 2014	(i) air quality index; amount of erosion on the natural site; frequency of environmental accidents related to tourism); (ii) urbanisation; production of energy from renewable sources; ecological state of fresh water; percentage of separate waste collection; percentage of farming area occupied by organic farming; (iii) no. of tourists per square metre of beaches in coastal zone; no. of peak-season tourists per square metre of beaches; waste volume produced by	(i) availability of local credit to local business; employment growth in tourism; percent of income leakage out of the community; (ii) employment rate; no. of enterprises with ISO 14001 or Environmental Management and Audit Scheme (EMAS) certificate; rate of new enterprises survived after 18 months; female entrepreneurship; rate of commuting population; per capita value added; (iii) total no. of tourist arrivals in coastal zone; daily average expenditures of sun and beach tourists; ratio of peak-month tourists to low-	(i) resident involvement in tourism industry, visitor satisfaction/attitude towards tourist destinations, litter/pollution; (ii) N/A; (iii) ratio of tourists to locals; ratio of peak season tourists to locals; sports facilities per inhabitant available to the community; health centres per inhabitant available to the community; public transport vehicles for travellers and merchandise per inhabitant; ratio of peak-season tourism	Not mentioned	Proposals that were relevant to the objective of this article include: (i) [70]; (ii) [71]; (iii) [72]

		destinations; volume of glass recycled; percentage of energy consumption attributed to tourism; percentage of renewable energy consumption attributed to tourism; consumption of urban supplying water attributed to tourism; volume of water reused; volume of sewage receiving treatment; percentage of coastal zone considered to be in eroded state; percentage of beach area considered to be in high-urbanisation state; percentage of sampling points with good sanitary qualification; percentage of beach area with Blue Flag status; percentage of beach area with cleaning services; percentage of beach area considered to be protected natural area; percentage of beach area considered to be in high-occupation state	month tourists; occupancy rate for official accommodations; ratio of average peak-season occupancy rate to average low-season occupancy rate for official accommodations; percentage of official tourism accommodation establishments which open all year; ratio of tourism employment to total employment; public investments in coastal issues	employment to low-season tourism employment; percentage of beach area without security devices in coastal zone; no. of crimes and misdemeanours made at provincial level		
41	Kristjánsdóttir et al., 2017	no specific examples of indicators			Not mentioned	- Focus on integrated indicators
42	Caldeira Sanches et al., 2018	no specific examples of indicators			Not mentioned	
43	Manrai et al., 2020	tourist arrivals, average tourist nights, total tourist nights, expenditure per tourists stay, expenditure per tourist night, gross tourism receipts, foreign exchange leakage, net tourism receipts, population and per capita net tourism receipts; low local crime rate, clean food and water			Not mentioned	Focus on Destination

9	Marković Vukadin et al., 2020	reduction the of impact from the energy and traffic sectors, mitigation of and adaptation to climate change, sustainable waste management, wastewater treatment, water management, landscape and biodiversity protection, light and noise pollution, and achieving satisfactory water quality for swimming	tourism traffic, business results of tourism enterprises, quantity and quality of employment, safety and health, tourism supply chain	(social and cultural) impact on community/ society, gender equality, conservation and enhancement of cultural heritage, local identity and property	Not mentioned	Proposal of the European Tourism Indicators System (includes also destination management indicators)
8	Purwaningsih et al., 2020	reducing impact, management, impact, resource efficiency, use of resources, biodiversity, sanitation, infrastructure, environment protection, climate change, pollution, attitude toward environmental protection	competitiveness, branding, local prosperity, tourism flow (volume and value at destination, tourism employs, business enterprise related to destination, and sustaining tourist satisfaction	visitor fulfilment, safety and health, culture richness and exchange, visitor compliance, local interaction, population, psychological, effect on level of well-being in local population, soft infrastructure related to tourism, conservation of cultural heritage, protecting culture and accessibility to inclusion	Not mentioned	N/A
44	Rasoolimanesh et al., 2020	no specific examples of indicators			Not mentioned	N/A
B) sustainable tourism assessment based on LCT						
45	Filimonau, 2011	annual energy use			Yes, based on the LCT concept	
46	Cavalcanti Falcão and Pasa Gómez, 2012	environmental education (community access to environmental education, valuing environmental heritage); conservation and protection of the tourist product (preservation of natural resources, carrying capacity of	encouraging entrepreneurship (credit sources for local entrepreneurs, training and encouraging the opening of small businesses, nature of business of destination); economic viability of tourism activity (tourism infrastructure, seasonality); capacity for income expansion (participation of tourism	quality of community life (access to health, access to education, public transportation, housing); dynamics of tourism in the destination (tourist frequency density, training the population for tourism)	Yes, based on the Tourist Area Life Cycle Evolution	N/A

		natural attractions, visual pollution, noise pollution)	activity in the local economy, job creation)			
47	Soares et al., 2012	massification, deficient infrastructures, water pollution, visual pollution, congestion and traffic, erosions, ecological disorders	contribution of tourism to GDP, participation of tourism in the economy in relation to other economic activities (monoculture), jobs generated, salaries, profitability of the private sector, imports, inflation	(not specifically called Social) the perception of residents about the impacts (social carrying capacity), the perception of residents about tourists, unemployment rate, security. overcrowding: permanent population / number of tourists, increase in population density	Yes, based on the Tourist Area Life Cycle Evolution	Focus on coastal destinations
48	Arcese et al., 2013			fair salary (workers), health and safety (customers), privacy (customers), transparency (customers), cultural heritage (local community)	Yes, based on the LCT concept	Focus only on Social Life Cycle Assessment
49	Filimonau, 2016	climate change, acidification, nutrient enrichment, photochemical oxidants			Yes, based on the LCT concept	N/A
50	Kulkajonplun et al., 2016	loss of biodiversity; land management (based on philosophy of sufficiency economy); carbon emission into the air; use of renewable energy; energy use; climate change	GPP; capital, sales and profits; investment (finance, human resources, environment and renewable energy); value creation	bribery/fraud; employment rights/security; development of human resources; equality of labour; health and safety; human rights/business ethics; management of workers; building relationship with communities; local participation in organization; development of local communities	Yes, based on the LCT concept	- Focus on sustainable resorts - Index, developed based on the Global Report Initiative:

51	Michailidou et al., 2016	(i) energy-oriented, (ii) water-oriented, (iii) waste-oriented, (iv) carbon footprint-oriented (hotels) and (v) carbon footprint-oriented (transport).			Yes, based on the LCT concept	- Focus on a Defined Area of Concentrated Tourism - Name of indicator: Tourism Environmental Composite Indicator (TECI)
52	Steinmann et al., 2016	(i) climate change, ozone depletion, the combined effects of acidification and eutrophication, terrestrial ecotoxicity, marine ecotoxicity, and land use; (ii) energy, water, land, materials			Yes, based on the LCT concept	N/A
53	Kalbar et al., 2017	carbon footprint (partially)			Yes, based on the LCT concept	Focus on urban consumption
54	Puig et al., 2017	carbon footprint			Yes, based on the LCT concept	
55	Todorovic, 2019	no specific examples of indicators			Yes, based on the Tourist Area Life Cycle Evolution	Focus on Destination
56	Zagonari, 2019	no specific examples of indicators			Yes, based on the LCT concept	Use of weighted life-cycle assessment is better than multi-criteria analysis for alternative tourism
57	Cavallin Toscani et al., 2021	no specific examples of indicators			Yes, based on the LCT concept	Focus on events
58	Soratana et al., 2021	(i) raw materials (appropriateness of attraction to local material environmental conditions, quality of local's environment);			Yes, based on the LCT concept	Based on the Global Sustainable Tourism Council

		(ii) operation (budget for environmental management, units for environmental protection including cleaning, systems to manage, control and monitor resource consumption, natural disaster prevention, communication on environmental awareness for tourists, policy, laws and regulations related to attraction's environment); (iii) use (promoting on energy consumption reduction to stakeholders, promoting on water consumption reduction to stakeholders, promoting on other resources consumption reduction to stakeholders); (iv) end of life (wastewater treatment system before discharging, waste disposal system including waste collection system)		criteria, integrated with LCT
C) circular tourism assessment				
		Circularity Indicators/indices		
59	Zhao & Thao, 2011	resource use efficiency, recycling rate, environmental protection of resources, environmental monitoring and certification, economic importance, tourism revenue, management efficiency and social benefits	Not mentioned, but potentially compatible for some of them	Focus on tourism site
60	Scheepens et al., 2016	Eco-costs Value Ratio (EVR) model, including costs, market value and eco-costs, two methods are applied for analysis and design: Eco-efficient Value Creation (EVR benchmarking) and the Circular Transition Framework (describing stakeholder activities which are required for the transition towards sustainable business models).	Yes, based on LCT concept	Focus on tourism service in coastal destination
61	Maugeri et al. 2017	LCA of one-night stay including transport from hotel by car, but circular economy not really central to paper	Yes, based on the LCT concept	Focus on accommodation
62	Nocca, 2017	number of restoration and adaptation works undertaken on historic buildings/sites, the percentage of re-functionalized historic buildings, and the area of facades of historic buildings rehabilitated (m^2)	LCT is mentioned in the context of CE (also closing the loop)	Focus on cultural heritage
63	Pan et al., 2018	renewable energy, energy saving, green transport, low-carbon building, environment greening, circular resources, low-carbon life, management mechanism, education and training, partnership	Yes, also based on LCT concept	Focus on tourism destination - Self-developed indicator framework
64	Randazzo et al., 2019	mainly about energy use (kWh)	LCT is mentioned in the context of system boundaries	Focus on energy management in island tourism destination
65	Son et al., 2018	waste generation rate, waste separation rate, recycling potential, composting potential, separated food residue, non-recyclable residue	Not mentioned	Focus on accommodation
66	Hartley-Ballestero & Suárez-Espinoza, 2020	increase of forest surface, quantity of provinces with spatial planning management, communities with community-based rural tourism, organisations with sustainable tourism, percentage of water treated, water supply, electricity supply, internet coverage, drinking water quality, treated industrial discharges, treated wastewater, environmental education, separation and recycling of solid waste, protected areas management	Not mentioned, but potentially compatible (mentions biological and water life cycle)	Focus on protected forest tourism destination

		plan, tourist police, use of drinking water, control of drinking water use, reforestation campaigns, water protection		
67	Voukkali et al., 2021	driving forces–pressure–state–impact–response (DPSIR) concept approach to evaluate the study area, clean index identification, waste accumulation index (WAI) and waste accumulation rate, Waste compositional analysis, circular economy only mentioned once	Not mentioned (only in lit review)	Focus on waste management in coastal areas