



Appendix 3e.
List of Potential Socio-economic Indicators for
the Madrean Region

Transboundary Madrean Watersheds Landscape Conservation
Design Report

Version 1.2
June 30, 2020

	Indicator	Theme	Notes	Relevant to Madrean?	Relevant to Mojave?	Relevant to Dos Rios?	Type of Source	Citation 1	Source 1	Citation 2	Source 2	Citation 3	Source 3
1	Visitor Use Days	Recreation	Social value	Yes	Yes	Yes	modified Socio.-Ecol. DLCC Excel spreadsheet		Madrean Conservation Design Analysis Framework				
2	E-Bird Hotspots Located per River Corridor	Recreation	Social value/Ecol. cond.	Yes	Yes	Yes	modified Socio.-Ecol. DLCC Excel spreadsheet		Madrean Conservation Design Analysis Framework				
3	Recreation User Days (or another measure)	Recreation	Social value	Yes	Yes	Yes	DLCC Excel spreadsheet		Madrean Conservation Design Analysis Framework				
4	Economic vitality	Economic Conditions and Livelihoods	Social value	Yes	Yes	Yes	Cienega Watershed Partnership		https://drive.google.com/open?id=1j4NEJW3EK-r10lcbk80ne1vY_7nHEvs				
5	Land use-land cover	Land (general)	Social value	Yes	Yes	Yes	Cienega Watershed Partnership		https://drive.google.com/open?id=1j4NEJW3EK-r10lcbk80ne1vY_7nHEvs	Dumanski and Pieri 2000	https://drive.google.com/open?id=1_IWn1wii4EDKXpC07s5R3_7DcK1a7vGld		
6	Achaeological sites - condition class	Culture	Social value	Yes	Yes	Yes	Cienega Watershed Partnership		https://drive.google.com/open?id=1j4NEJW3EK-r10lcbk80ne1vY_7nHEvs				
7	Number of permits	Mixed/Multiple	Social value	Yes	Yes	Yes	Cienega Watershed Partnership		https://drive.google.com/open?id=1j4NEJW3EK-r10lcbk80ne1vY_7nHEvs				
8	Stewardship and public engagement	Participation in Conservation	Social value	Yes	Yes	Yes	Cienega Watershed Partnership		https://drive.google.com/open?id=1j4NEJW3EK-r10lcbk80ne1vY_7nHEvs				
9	Traditional cultural knowledge/value to Native peoples	Culture	Social value/Ecol. cond.	Yes	Yes	Yes	modified Socio.-Ecol. DLCC Excel spreadsheet		Madrean Conservation Design Analysis Framework				
10	Aesthetic value	Culture	Social value/Ecol. cond.	Yes	Yes	Yes	S. Wilbor-modified Socio.-Ecol. DLCC Excel spreadsheet		Madrean Conservation Design Analysis Framework		https://drive.google.com/open?id=1xR97i97ELEUxJ3BqhP8HH4esMdgUBXNU		
11	Number and type of Special use	Mixed/Multiple	Social-economical	yes	Yes	Yes	Coronado National Forest draft		CoronadoNF_Monitoring_Chapter6_Draft_4_12_2017.docx				
12	Number of permanent access roads	Recreation	Social value	Yes	Yes	Yes	Coronado National Forest draft		CoronadoNF_Monitoring_Chapter6_Draft_4_12_2017.docx				
13	Land owner/manager	Governance	Social value	Yes	Yes	Yes	Mohave REA		MojaveBasinandRangeRapidEcoregionalAssessmentFinalReport.pdf				

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14	Hunting	Recreation	Social-economical				Call to SWG		SWG brainstorming doc		https://drive.google.com/open?id=1EfrBjaW1NW9mkhXW-nllwxOMzfbzxDf		
15	Viewscapes, viewsheds, viewshed buffers around farmscapes, historical landscapes, etc.	Land (general)					SALCC call		https://docs.google.com/document/d/1IGWAI55CmOSENrJJulDFlaQQA15LquSLO88gM9mg6dM/edit?usp=sharing				
16	Fish harvests	Recreation					Brainstorm; articles	Brainstorm doc	https://docs.google.com/document/d/1bHssoWgPabN7DCuOfSjIE_hOvdbBh0fiaZFs3-Y_m8/edit?usp=sharing	Azar et al. 1996	https://drive.google.com/open?id=1EfrBjaW1NW9mkhXW-nllwxOMzfbzxDf		
17	Campsites/state park, etc. use	Recreation					Brainstorm		https://docs.google.com/document/d/1bHssoWgPabN7DCuOfSjIE_hOvdbBh0fiaZFs3-Y_m8/edit?usp=sharing				
18	Reservoir water levels	Water					Brainstorm		https://docs.google.com/document/d/1bHssoWgPabN7DCuOfSjIE_hOvdbBh0fiaZFs3-Y_m8/edit?usp=sharing				
19	Water quality in reservoirs	Water					Brainstorm		https://docs.google.com/document/d/1bHssoWgPabN7DCuOfSjIE_hOvdbBh0fiaZFs3-Y_m8/edit?usp=sharing				
20	Carbon sequestration	Human Health					article	Nelson et al. 2009	https://esajournals.onlinelibrary.wiley.com/doi/10.1890/080023	National Research Council 2010	https://drive.google.com/open?id=1xWPxAU7S8cDVogvrKUXTqXkLWtMp9ViLc		
21	Market value of commodity production	Economic Conditions and Livelihoods					article	Nelson et al. 2009	https://esajournals.onlinelibrary.wiley.com/doi/10.1890/080023				
22	Water quality (general); current water quality below quality standards	Water					article	Nelson et al. 2010	https://esajournals.onlinelibrary.wiley.com/doi/10.1890/080023	Albert et al. 2015	https://drive.google.com/open?id=1zocjONK1suu7PeKmbMGNeBkLnobg154W		

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23	Soil conservation (average annual rate of soil erosion)	Land (general)					article	Nelson et al. 2011	https://esaajournals.onlinelibrary.wiley.com/doi/10.1890/080023				
24	House prices (in relation to proximity to open space/green space/ blue space)	Economic Conditions and Livelihoods					article	Gledhill and James 2012	https://drive.google.com/open?id=1_oKtF_UJIHohdYxSWQMq2EwZPrxR7cO6				
25	Output Area Classification (OAC)	Mixed/Multiple					article	Gledhill and James 2013	https://drive.google.com/open?id=1_oKtF_UJIHohdYxSWQMq2EwZPrxR7cO6				
26	Transformation of lands (conversion)	Land (general)					article	Azar et al. 1996	https://drive.google.com/open?id=1EFRBjaW1NW9mKhXW-nlIwxQMzfbzxDf	Bowen and Riley 2003	https://drive.google.com/open?id=1pvDVkiyZvOtyw3SDOFYK&WuCSaucXro	Scolozzi et al. 2014	https://drive.google.com/open?id=1pwzhMNTRT0niApuCLSUii0DRf2RuxpaB
27	Stakeholder participation levels in conservation	Participation in Conservation					article	Agol et al. 2014	https://drive.google.com/open?id=1LgQ8I21hghW--Zi7MtGmCAa3T7jvtDxn				
28	Public awareness in conservation	Education					article	Agol et al. 2015	https://drive.google.com/open?id=1LgQ8I21hghW--Zi7MtGmCAa3T7jvtDxn	Jalilova et al. 2012	https://drive.google.com/open?id=1xR97I97ELEUxJ3BqhP8HH4esMdgUBXNU		
29	Level of media coverage	Education					article	Agol et al. 2016	https://drive.google.com/open?id=1LgQ8I21hghW--Zi7MtGmCAa3T7jvtDxn	Jalilova et al. 2013	https://drive.google.com/open?id=1xR97I97ELEUxJ3BqhP8HH4esMdgUBXNU		
30	Level of avoided CO2 emissions	Human Health					article	Agol et al. 2017	https://drive.google.com/open?id=1LgQ8I21hghW--Zi7MtGmCAa3T7jvtDxn				
31	Degree of people's participation in management and benefit-sharing	Participation in Conservation					article	Kotwal et al. 2008	https://drive.google.com/open?id=1x5cn2Lp-TqX1FO1YjsX64-P9eRvWpmc6	Jalilova et al. 2013	https://drive.google.com/open?id=1xR97I97ELEUxJ3BqhP8HH4esMdgUBXNU		
32	Use of indigenous technical knowledge: identification, documentation and application	Culture					article	Kotwal et al. 2009	https://drive.google.com/open?id=1x5cn2Lp-TqX1FO1YjsX64-P9eRvWpmc6				
33	Quality and extent to which concessions and privileges are provided	Economic Conditions and Livelihoods					article	Kotwal et al. 2010	https://drive.google.com/open?id=1x5cn2Lp-TqX1FO1YjsX64-P9eRvWpmc6				

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34	Extent of cultural/sacred protected landscapes: forests, trees, ponds, streams, etc. (type, area, and number of visitors)	Culture					article	Kotwal et al. 2011	https://drive.google.com/open?id=1x5cn2Lp-TqX1FO1YjsX64-P9eRvWpmc6				
35	Level of investment in research and development	Economic Conditions and Livelihoods					article	Kotwal et al. 2012	https://drive.google.com/open?id=1x5cn2Lp-TqX1FO1YjsX64-P9eRvWpmc6				
36	Degree of contribution of forest management activities (tax, payment)--perhaps this could also extend to volunteering, conservation easements?	Participation in Conservation					article	Jalilova et al. 2013	https://drive.google.com/open?id=1xR97197ELEUxj3BqhP8HH4e_sMdqUBXNU				
37	Access of local communities to ecological education	Education					article	Jalilova et al. 2013	https://drive.google.com/open?id=1xR97197ELEUxj3BqhP8HH4e_sMdqUBXNU				
38	Conservation of local tradition and religion	Culture					article	Jalilova et al. 2013	https://drive.google.com/open?id=1xR97197ELEUxj3BqhP8HH4e_sMdqUBXNU				
39	Respecting management plans	Governance					article	Jalilova et al. 2013	https://drive.google.com/open?id=1xR97197ELEUxj3BqhP8HH4e_sMdqUBXNU				
40	Diversity of local food system	Economic Conditions and Livelihoods					article	Sterling et al. 2017	https://drive.google.com/open?id=1QeJ_tQaRIS2EST6nB0d17Mi_hZU_5xb0				
41	Sustainable management of common resources	Economic Conditions and Livelihoods					article	Sterling et al. 2018	https://drive.google.com/open?id=1QeJ_tQaRIS2EST6nB0d17Mi_hZU_5xb1				
42	Innovation in agriculture and conservation practices	Economic Conditions and Livelihoods					article	Sterling et al. 2019	https://drive.google.com/open?id=1QeJ_tQaRIS2EST6nB0d17Mi_hZU_5xb2				
43	Community-based landscape governance	Governance					article	Sterling et al. 2020	https://drive.google.com/open?id=1QeJ_tQaRIS2EST6nB0d17Mi_hZU_5xb3				
44	Social capital in the form of cooperation across the landscape	Governance					article	Sterling et al. 2021	https://drive.google.com/open?id=1QeJ_tQaRIS2EST6nB0d17Mi_hZU_5xb4				
45	Human health and environmental conditions	Human Health					article	Sterling et al. 2022	https://drive.google.com/open?id=1QeJ_tQaRIS2EST6nB0d17Mi_hZU_5xb5	Millennium Assessment Report	https://www.millenniumassessment.org/en/Framework.html		
46	Biodiversity-based livelihoods	Economic Conditions and Livelihoods					article	Sterling et al. 2023	https://drive.google.com/open?id=1QeJ_tQaRIS2EST6nB0d17Mi_hZU_5xb6				

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47	Proportion of grasslands in agricultural areas (contribution to animal production)	Economic Conditions and Livelihoods					article	Albert et al. 2015	https://drive.google.com/open?id=1zociONK1suu7PeKmbMGNeBkLnobg154W				
48	Proportion of arable crops demanding insect pollination	Economic Conditions and Livelihoods					article	Albert et al. 2016	https://drive.google.com/open?id=1zociONK1suu7PeKmbMGNeBkLnobg154W				
49	Recreational functions of variable ecosystem characteristics (e.g. naturalness, diversity, privacy, supply of specific uses)	Recreation					article	Albert et al. 2018	https://drive.google.com/open?id=1zociONK1suu7PeKmbMGNeBkLnobg154W				
50	Multiple ecosystem services landscape index (MESLI)	Mixed/Multiple					article	Rodríguez-Loínez et al. 2015	https://drive.google.com/open?id=1PV2k_zUJITg5JirYfdpihV4Liz9_givwm				
51	Human population dynamics (e.g. population, zoning)	Economic Conditions and Livelihoods					article	Bowen and Riley 2003	https://drive.google.com/open?id=1pvDVkjvZvOtw3SDOFYK8W_uCSgucXro	Millennium Assessment Report	https://www.millenniumassessment.org/en/Framework.html		
52	Economic conditions (annual GDP, economic value/employment)	Economic Conditions and Livelihoods					article	Bowen and Riley 2004	https://drive.google.com/open?id=1pvDVkjvZvOtw3SDOFYK8W_uCSgucXro				
53	Contaminant introduction	Human Health					article	Bowen and Riley 2005	https://drive.google.com/open?id=1pvDVkjvZvOtw3SDOFYK8W_uCSgucXro				
54	Resource extraction activities	Economic Conditions and Livelihoods					article	Bowen and Riley 2006	https://drive.google.com/open?id=1pvDVkjvZvOtw3SDOFYK8W_uCSgucXro				
55	holistic ecosystem health indicator (HEHI)	Mixed/Multiple					article	Muñoz-Erickson et al. 2007	https://drive.google.com/open?id=1IyaBMk_ox189m0NQhviVQI_68tA5ItYa				
56	Collaborative social outcomes	Participation in Conservation					article	Muñoz-Erickson et al. 2007	https://drive.google.com/open?id=1IyaBMk_ox189m0NQhviVQI_68tA5ItYa				
57	Impact on ranches	Economic Conditions and Livelihoods					article	Muñoz-Erickson et al. 2008	https://drive.google.com/open?id=1IyaBMk_ox189m0NQhviVQI_68tA5ItYa				
58	Economic stability	Economic Conditions and Livelihoods					article	Muñoz-Erickson et al. 2009	https://drive.google.com/open?id=1IyaBMk_ox189m0NQhviVQI_68tA5ItYa				
59	Local unemployment rate	Economic Conditions and Livelihoods					article	Muñoz-Erickson et al. 2010	https://drive.google.com/open?id=1IyaBMk_ox189m0NQhviVQI_68tA5ItYa				

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60	Community strength	Culture					article	Muñoz-Erickson et al. 2011	https://drive.google.com/open?id=1IyaBMk_oX189m0NQhviVQI_68tA5ItYa				
61	Economic status of ranches	Economic Conditions and Livelihoods					article	Muñoz-Erickson et al. 2012	https://drive.google.com/open?id=1IyaBMk_oX189m0NQhviVQI_68tA5ItYa				
62	Community satisfaction	Culture					article	Muñoz-Erickson et al. 2013	https://drive.google.com/open?id=1IyaBMk_oX189m0NQhviVQI_68tA5ItYa				
63	Decision making process	Governance					article	Muñoz-Erickson et al. 2014	https://drive.google.com/open?id=1IyaBMk_oX189m0NQhviVQI_68tA5ItYa				
64	Ratio of urban to rural areas	Land (general)					article	Muñoz-Erickson et al. 2015	https://drive.google.com/open?id=1IyaBMk_oX189m0NQhviVQI_68tA5ItYa				
65	Per capita income	Economic Conditions and Livelihoods					article	Muñoz-Erickson et al. 2016	https://drive.google.com/open?id=1IyaBMk_oX189m0NQhviVQI_68tA5ItYa				
66	Land use intensity and diversity	Land (general)					article	Dumanski and Pieri 2000	https://drive.google.com/open?id=1IWn1wii4EDKXpC07s5R37_DcK1a7vGLd				
67	Air quality for residents	Human Health					Brainstorm						
68	Ecological services value for communities	Participation in Conservation					Brainstorm						
69	Willingness to pay for ecosystem services	Participation in Conservation					Brainstorm						
70	Inter community resource sharing	Participation in Conservation					Brainstorm						
71	Resources cultural awareness workshops	Governance					Brainstorm						
72	water use patterns, virtual water and water footprints	Economic Conditions and Livelihoods					Brainstorm						
73	Spiritual enrichment aspects	Culture					Brainstorm						
74	Quality of life	Mixed/Multiple						Budrick and Phillips 2010	https://drive.google.com/open?id=19cXblw_r3g0ccxiWS4tOxyYzc_wuefIDFt				