

Table S1. List of Indicators and Methods Used for Freshwater and Marine Protected Areas

Indicator Category	Unique #	Indicator Name	Measurement	Examples of Sampling Methodology(s)	Citation(s) for Freshwater	Citation(s) for Marine
Biophysical	1	Area showing signs of recovery	Estimated frequency of recovery milestones met	No examples explicitly examined this.		
Biophysical	1	Area showing signs of recovery	Estimated proportion of recovery within focal species populations against target	No examples explicitly examined this.		
Biophysical	1	Area showing signs of recovery	Number of fish species that are "direct beneficiaries"	focus group interviews with stakeholders	Baird and Flaherty 2005	
Biophysical	1	Area showing signs of recovery	Percent of project area restored (as a % change in structure/biomass/density/abundance/total cover)	HABITAT: aerial photos	Robinson et al. 2011	
Biophysical	2	Area under no or reduced human impact	Number of fishers or fishing boats (quantitative)	structured interviews or focus groups; observations		
Biophysical	2	Area under no or reduced human impact	Presence and level of human activities (qualitative)	key informant interviews		

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Biophysical	3	Composition and structure of the community	Diversity (alpha = mean species richness inside/outside of protected area; beta = relationship between average local species richness (a) and the total number of species (S); the relationships between maximum local species richness and the total number of species in the data set; Sorensen's index;	FISH: underwater visual census; standard gill net surveys; market and creel surveys; INVERTS: kick-net sampling for macroinvertebrates; 50x50 cm quadrates for macrophyte, hand net sampling; Surber Sampler for benthic macroinvertebrates	Paz et al. 2008 (Shannon-Wiener Index); Heino et al. 2009 (various); Casado et al. 2011 (Shannon-Wiener, using Log2); Sweke et al. 2013 (Shannon-Wiener Diversity Index; H'); Sarkar et al. 2013 (Shannon Diversity Index; H', Jaccard's index of similarity; J'); Guareschi et al. 2015 (various)	Dufour et al. 1995 (Shannon-Weaver Diversity Index; H'); Camargo et al. 2009 (Shannon Diversity Index; H', Jaccard's index of similarity; J'); Tkachenko et al. 2010 (Shannon-Weaver Diversity Index; H'); Soykan and Lewison 2015 (metadata analysis; Shannon diversity, Simpson diversity, Zipf-Mandelbrot b)
Biophysical	3	Composition and structure of the community	Dominance			Camargo et al. 2009; Soykan and Lewison 2015 (metadata analysis; relative, McNaughton, Zipf-Mandelbrot c)
Biophysical	3	Composition and structure of the community	Evenness	INVERTEBRATES: Surber Sampler for benthic macroinvertebrates	Paz et al. 2008 (Pielou's index)	Soykan and Lewison 2015 (metadata analysis, Gambin alpha, eCDF slope, eCDF inflection, y shape, Shannon evenness)
Biophysical	3	Composition and structure of the community	Multivariate statistics: (PERMANOVA+); detrended Canonical Correspondence Analysis; PCA	FISH: bamboo traps; standard gill net surveys; underwater visual census	Sanyanga et al. 1995; Silvano et al. 2009; Srinoparatwatana and Hyndes 2011	Dufour et al. 1995; Tkachenko et al. 2010

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Biophysical	3	Composition and structure of the community	Rarity	FISH: Point Abundance Sampling electrofishing method	Chantepie et al. 2011	Soykan and Lewison 2015 (metadata analysis, log skew, percentage rare N/S)
Biophysical	3	Composition and structure of the community	Species richness (S')	FISH: underwater visual census; Point Abundance Sampling electrofishing method; modified lift net (in a wetland); bamboo traps; standard gill net surveys; market and creel surveys; INVERTEBRATES: hand net sampling; kick-net sampling for macroinvertebrates; 50x50 cm quadrates for macrophyte; Surber Sampler for benthic macroinvertebrates	Paz et al. 2008; Heino et al. 2009; Casado et al. 2011; Chantepie et al. 2011 (not assessing FPA, just developing indicators); Srinoparatwatana and Hyndes 2011; Chessman 2013; Sarkar et al. 2013; Sweke et al. 2013; Penha et al. 2014	Halpern 2003 and Lester et al. 2009 (for metadata analyses); Camargo et al. 2009 (but only for three families of fish); Dufour et al. 1995; Tkachenko et al. 2010 (also used Margalef's species richness index), Soykan and Lewison 2015 (metadata analysis, number of species sampled, Margalef diversity, log series α)

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Biophysical	3	Composition and structure of the community	Various existing diversity and composition indices	FISH: Point Abundance Sampling electrofishing method INVERTEBRATES: Surber Sampler for benthic macroinvertebrates	Paz et al. 2008 (Biological Monitoring Working Party scoring system, Average Score Per Taxon (ASPT) score, % EPT (Ephemeroptera, Plecoptera and Trichoptera), %EPT richness); Casado et al. 2011 (Biological Monitoring Working Party scoring system); Chantepeie et al. 2011 (Origin Index; biodiversity conservation concern index (BCC) following Fattorini (2005); aggregative conservation index (Q)	
Biophysical	4	Focal species abundance	Focal species abundance	FISH: underwater visual census; Point Abundance Sampling electrofishing method; bamboo traps; standardized gill net surveys	Sanyanga et al. 1995; Cucherousset et al. 2007; Silvano et al. 2009; Srinoparatwatana and Hyndes 2011; Sarkar et al. 2013; Sweke et al. 2013	Halpern 2003 (for metadata analyses); Camargo et al. 2009; Lester et al. 2009 (for metadata analyses); Garces et al. 2012; Da Silva et al. 2015.
Biophysical	4	Focal species abundance	Focal species density	FISH: underwater visual census; modified lift net (in a wetland)	Paz et al. 2008 (looked at density of plants); Penha et al. 2014	Dufour et al. 1995; Halpern 2003 and Lester et al. 2009 (for metadata analyses); Tkachenko et al. 2010; Anderson et al. 2014

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Biophysical	4	Focal species abundance	Focal species biomass	FISH: underwater visual census (L-to-W to estimate biomass); bamboo traps; standardized gill net surveys	Silvano et al. 2009; Srinoparatwatana and Hyndes 2011	Halpern 2003 and Lester et al. 2009 (for metadata analyses); Dalton et al. 2012; Garces et al. 2012; Anderson et al. 2014; Da Silva et al. 2015
Biophysical	5	Focal species population structure	Mean size of individuals	FISH: standard gill net surveys; underwater visual census	Sanyanga et al. 1995; Sarkar et al. 2013	Halpern 2003; Lester et al. 2009 (for metadata analyses); Dalton et al. 2012
Biophysical	5	Focal species population structure	Proportion of fish categorized as large	FISH: underwater visual surveys		Dufour et al. 1995
Biophysical	5	Focal species population structure	Size structure	FISH: underwater visual surveys; fyke nets trapping, eel pots; bamboo traps; standard gill net surveys	Sanyanga et al. 1995; Cucherousset et al. 2007; Srinoparatwatana and Hyndes 2011	Dufour et al. 1995; Camargo et al. 2009; Tkachenko et al. 2010; Garces et al. 2012 (no measurement or method described)
Biophysical	6	Food web integrity	Characterization of the trophic roles and predator prey relationships (qualitative); measure of predation rates			Muthiga 2009; Garces et al. 2012 (no measurement or method described)
Biophysical	7	Habitat distribution and complexity	Habitat composition	underwater visual line transects or quadrats	Sweke et al. 2013	Tkachenko et al. 2010; Garces et al. 2012; Da Silva et al. 2015
Biophysical	7	Habitat distribution and complexity	Habitat distribution	underwater visual line transects	Sweke et al. 2013	Garces et al. 2012
Biophysical	8	Presence or absence of a species	Presence of alien invasive species	Key informant interviews, literature reviews	Rodriguez-Rodriguez et al. 2013	
Biophysical	9	Recruitment success within the community	Recruitment success	light traps, collection plates		Garces et al. 2012

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Biophysical	10	Total abundance by taxa	Total abundance	FISH: underwater visual census; gill nets and seine nets INVERTEBRATES: hand net sampling	Silvano et al. 2009; Casado et al. 2011; Chessman 2013	Dufour et al. 1995; Halpern 2003 and Lester et al. 2009 (for metadata analyses); Garces et al. 2012; Soykan and Lewison 2015 (metadata analysis, total abundance, y scale, log normal μ , log normal σ , log series c); Da Silva et al. 2015
Biophysical	10	Total abundance by taxa	Total biomass	FISH: modified lift net (in a wetland), underwater visual census; bamboo trap, gill nets and seine nets	Silvano et al. 2009; Srinoparatwatana and Hyndes 2011; Penha et al. 2014	Halpern 2003 and Lester et al. 2009 (for metadata analyses); Garces et al. 2012; Soykan and Lewison 2015 (metadata analysis); Da Silva et al. 2015
Biophysical	10	Total abundance by taxa	Total density	FISH: modified lift net (in a wetland); bamboo trap INVERTEBRATES: Surber Sampler for benthic	Paz et al. 2008; Srinoparatwatana and Hyndes 2011; Penha et al. 2014	
Biophysical	11	Type, level and return on fishing effort	Harvest CPUE outside of protected area	FISH: # of fish per hour per ha, based on fishing licenses and anonymous questionnaires; household survey and key informant interviews (can also be done with logbook, creel surveys or observers); mean catch per trip by gear type	Cucherousset et al. 2007	Garces et al. 2012; Tupper et al. 2015

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Biophysical	12	Water quality	Temperature, conductivity, pH, dissolved oxygen, turbidity/transparency, other standard analyses	literature review, mutliparameter meter; monitoring data	Paz et al. 2008; Silvano et al. 2009; Robinson et al. 2011; Rodriguez-Rodriguez et al. 2013; Sarkar et al. 2013; Sweke et al. 2013	
Socioeconomic	13	Changes in conditions of ancestral and historical sites/features/monuments	Location, condition, accessibility, and folklore associated with ancestral and historical sites/features/monuments in or near the protected area	Key informant interviews; mapping; photographic documentation		Garces et al. 2012
Socioeconomic	14	Community infrastructure and business	Level of community services and infrastructure; number of type of commercial businesses, esp. those associated with the protected area	Interviews and key informant surveys; infrastructure/business checklist; review of secondary documents	Vermeersch 2014	Gjertsen 2005; Muthiga 2009
Socioeconomic	15	Distribution of formal knowledge to community	Ranking the level of awareness about information generated by scientific community on protected area use and ecosystem impacts	Interviews and household surveys (economic experimental game); review of secondary documents		Camargo et al. 2009; Muthiga 2009; Garces et al. 2012
Socioeconomic	16	Household income distribution by source	Sources of livelihood/income and their relative importance	Interviews and household surveys (participatory rural diagnostic, income profile, economic experimental game), ladder scale diagrams		Camargo et al. 2009; Maliao et al. 2009; Pajaro et al. 2010; Garces et al. 2012; Tupper et al. 2015; Weigel et al. 2015

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Socioeconomic	17	Household occupational structure	List of household members and occupations; Ranking of primary, secondary, and tertiary occupations; Distribution of occupation and sources of income across households and social groups (ages, genders)	Interviews and household surveys (participatory rural diagnostic, income profile, economic experimental game)	Vermeersch 2014	Camargo et al. 2009
Socioeconomic	18	Level of understanding of human impacts on resources	Anecdotes, stories, observations of apparent causes and effects, opinions of how to use natural environment, ranking of threats in terms of impact	Interviews and focal group surveys (participatory rural diagnostic, problems and opportunities matrix, economic experimental game); maps and transects; decision trees, Venn Diagrams, flow charts		Camargo et al. 2009; Garces et al. 2012; Marques et al. 2013; Velez 2014
Socioeconomic	19	Local aquatic resource use patterns	Characteristics of aquatic activities (equipment, methods, organization), resource users (gender, residency status, age); timing, location, and trends of activities	Interviews and focal group surveys (participatory rural diagnostic, productive profile); direct observations; maps of activity locations and use rights; timelines of event occurrence and seasonality; review of secondary documents	Baird 2006	Camargo et al. 2009; Pajaro et al. 2010; Garces et al. 2012; Muthiga 2009; Hamilton 2012; Tupper et al. 2015; Weigel et al. 2015

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Socioeconomic	20	Local values and beliefs about aquatic resources	Percentage of agreement with value statements; level of agreement with value statements; collection of motivations, beliefs, anecdotes	Interviews and household surveys (economic experimental game, social cartography)	Vermeersch 2014	Camargo et al. 2009; Marques et al. 2013; Velez 2014
Socioeconomic	21	Wealth/Material style of life	Assessment of assets associated with wealth and poverty	Interviews and household surveys		Pajaro et al. 2010
Socioeconomic	22	Number and nature of markets	10 most important vertebrate, invertebrate, and plant products; time, location, importance, and purpose of harvest; location of sales; degree of demand	Interviews and key informant surveys (participatory rural diagnostic, productive profile), map of market flow or product movement	Vermeersch 2014	Camargo et al. 2009; Garces et al. 2012; Tupper et al. 2015
Socioeconomic	23	Percentage of stakeholder group in leadership positions	Number of individual stakeholders from various groups who have been or are currently in a leadership position related to protected area management	Key informant interviews, review organizational structure of APA management; experimental economic game		Camargo et al. 2009
Socioeconomic	24	Perception of benefits derived from the APA	Agreement with statement that the APA has provided benefits; Description of ecological or social benefits that the APA has provided	Interviews and surveys with key informants	Baird and Flaherty 2005	Dalton et al. 2012; Warner and Pomeroy 2012; Hamilton 2012; Bennet and Dearden 2014

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Socioeconomic	25	Perceptions of fish or other aquatic food availability	Number of days reported of insufficient food in past month; number of days reported of insufficient seafood/aquatic food in past month; opinions of protected area effects on food availability	Interviews and surveys with household food purchasers/preparers, participatory rural diagnostic, seasonal analysis		Camargo et al. 2009; Pajaro et al. 2010
Socioeconomic	26	Perceptions of local resource harvest or abundance	Perceptions of: species caught; amount of fish caught; changes in focal species abundance today and before protected area	Interviews and surveys with fishers (participatory rural diagnostic, productive profile, social cartography, seasonal analysis, submarine profile); ladder scale diagrams	Vermeersch 2014	Gjertsen 2005; Camargo et al. 2009; Maliao et al. 2009; Pajaro et al. 2010; Dalton et al. 2012; Garces et al. 2012; Hamilton 2012; Marques et al. 2013; Velez 2014; Tupper et al. 2015
Socioeconomic	27	Perceptions of non-market and non-use values	Level of agreement with value statements related to non-market and non-use values (existence value, option value, bequest value)	Interviews and household surveys (economic valuation); economic experimental game		Camargo et al. 2009; Garces et al. 2012; Tupper et al. 2015
Socioeconomic	28	Quality of human health or well-being	Perception of well-being; infant mortality rate; availability of health services; child weight, occurrence of major diseases; prevalence of vaccinations	Interviews and surveys with key informants; review of secondary sources (health department data)		Gjertsen 2005

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Socioeconomic	29	Stakeholder knowledge of natural history	Observations, experiences, beliefs, and perceptions of cause and effect; degree to which local knowledge is passed to generations; local names for resources, places, and activities; knowledge of resource location, mobility, population size, interactions, behaviors; APA manager awareness and use of stakeholder knowledge	Interviews and focal group surveys/discussions (participatory rural diagnostic, historical analysis)	Baird and Flaherty 2005; Baird 2006 (indicator: perceptions of fish increases; fish surfacing in deep water pools, or croaking noises of fish; monitor algae grazing marks of algae eating fish)	Camargo et al. 2009
Governance	30	Availability and allocation of APA administrative resources	Human, financial, and equipment resources available to administer APA activities (number of staff, training, and experience, budget, equipment inventory), review of record keeping procedures	Key informant interviews; mapping; photographic documentation; review of secondary documents	Vermeersch 2014	Francis et al. 2002; Beger et al. 2005; Gjertsen 2005; Camargo et al. 2009; Garces et al. 2012; Muthiga 2009; Warner and Pomeroy 2012; Horigue et al. 2014; Tupper et al. 2015

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Governance	31	Clearly defined enforcement procedures	Existence and descriptions of guidelines and procedures for protected area enforcement; number of reported violations; number of successful or attempted prosecutions; accessibility and availability of enforcement guidelines	Key informant interviews/surveys; review of secondary documents	Vermeersch 2014	Beger et al. 2005; Camargo et al. 2009; Muthiga 2009; Garces et al. 2012; Rossiter and Levine 2013; Horigue et al. 2014
Governance	32	Community control over coastal resources	Community perception of ability to monitor and regulate internal use patterns of coastal resources	ladder scale diagram		Maliao et al. 2009
Governance	33	Community influence over management	Community perception of influence and bargaining power over decision making and management	ladder scale diagram		Maliao et al. 2009
Governance	34	Compliance with fisheries rules	Perceived conformity of behaviors of local resource users to prescribed rules; Instances of poaching	ladder scale diagram, direct observation, key informant interviews	Vermeersch 2014	Francis et al. 2002; Guidetti et al. 2008; Maliao et al. 2009; Warner and Pomeroy 2012; Rossiter and Levine 2013

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Governance	35	Degree of interaction between managers and stakeholders	Number of regularly scheduled meetings between protected area managers/staff and stakeholders	Key informant interviews/surveys; supporting document review	Vermeersch 2014	Camargo et al. 2009; Garces et al. 2012; Marques et al. 2013; Horigue et al. 2014; Velez et al. 2014; Tupper et al. 2015
Governance	36	Enforcement coverage	Number of patrols undertaken for a given time period and area; number and type of infractions per patrol	Key informant interviews/surveys; supporting document review		Guidetti et al. 2008; Camargo et al. 2009; Pajaro et al. 2010; Warner and Pomeroy 2012; Marques et al. 2013; Horigue et al. 2014
Governance	37	Equitable distribution of APA effects	Perceptions of equitable distribution of APA benefits/impacts	Key informant interviews/surveys		Dalton et al. 2012; Rossiter and Levine 2013
Governance	38	Existence and adoption of a management plan	Existence of a document with protected area goals and objectives, institutional structure of management, and portfolio of management measures	Key informant interviews/surveys; management plan checklist; economic experimental game	Vermeersch 2014	Francis et al. 2002; Beger et al. 2005; Camargo et al. 2009; Pajaro et al. 2010; Garces et al. 2012; Marques et al. 2013; Horigue et al. 2014; Tupper et al. 2015;
Governance	39	Existence of a decision-making and management body	Identification of management plan; location of decision making body; identification of APA staff; dates and location of meetings	Key informant interviews/surveys; organizational chart construction	Vermeersch 2014	Francis et al. 2002; Beger et al. 2005; Camargo et al. 2009; Garces et al. 2012; Horigue et al. 2014; Tupper et al. 2015
Governance	40	Existence and activity level of community organization(s)	Existence and characterization of community organizations	Key informant interviews/surveys		Beger et al. 2005; Camargo et al. 2009; Pajaro et al. 2010; Warner and Pomeroy 2012; Marques et al. 2013

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Governance	41	Existence and adequacy of enabling legislation	Assessment of laws and institutions associated with natural resource management and protected areas	Key informant interviews/surveys; legal analysis	Moller and Munoz-Pedrerros 2014; Vermeersch 2014	Camargo et al. 2009; Garces et al. 2012; Warner and Pomeroy 2012; Tupper et al. 2015
Governance	42	Existence and application of scientific research and input	Presence and characterization of scientific studies; review and accessibility of study outputs	Key informant interviews/surveys; literature review		Beger et al. 2005; Camargo et al. 2009
Governance	43	Fair allocation of access rights	Perceived fairness of allocation of rights to enter and withdraw resources	ladder scale diagram		Maliao et al. 2009
Governance	44	Information dissemination	Number and effectiveness of capacity-building efforts for stakeholders on benefits, rules, regulations and enforcement of the protected area	Key informant interviews/surveys; supporting document review	Vermeersch 2014	Camargo et al. 2009; Garces et al. 2012; Warner and Pomeroy 2012; Marques et al. 2013
Governance	45	Level of resource conflict	Issues, stakeholders, time period, intensity, and scale, and resolution of conflicts associated with the protected area	Key informant interviews/surveys; ladder scale diagram		Camargo et al. 2009; Maliao et al. 2009; Dalton et al. 2012; Garces et al. 2012; Marques et al. 2013; Rossiter and Levine 2013; Tupper et al. 2015

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Governance	46	Level of stakeholder involvement in surveillance, monitoring and enforcement	Number of stakeholders who participated in patrolling or other surveillance and monitoring activities; description of patrol activities and procedures	Key informant interviews/surveys; supporting document review		Francis et al. 2002; Beger et al. 2005; Camargo et al. 2009; Velez et al. 2014
Governance	47	Level of stakeholder participation & satisfaction in management	Amount of stakeholder active involvement in APA decisions and activities; satisfaction with participation	Key informant interviews/surveys; stakeholder analysis matrix, ladder scale diagram; Index of individual perception	Vermeersch 2014	Francis et al. 2002; Beger et al. 2005; Camargo et al. 2009; Maliao et al. 2009; Muthiga 2009; Moreno-Sanchez and Maldonado 2010; Pajaro et al. 2010; Dalton et al. 2012; Hamilton 2012; Rossiter and Levine 2013; Velez et al. 2014
Governance	48	Level of training provided to stakeholders in participation	Amount and effectiveness of capacity-building efforts to empower stakeholder participation; budget allocated for capacity building	Key informant interviews/surveys; supporting document review; observe participation in meetings; focal group discussion	Vermeersch 2014	Beger et al. 2005; Camargo et al. 2009; Marques et al. 2013
Governance	49	Local understanding of APA rules and regulations	Level of awareness and understanding of protected area rules and regulations	Key informant interviews/surveys; experimental economic game	Vermeersch 2014	Camargo et al. 2009; Moreno-Sanchez and Maldonado 2009; Pajaro et al. 2010; Garces et al. 2012; Velez et al. 2014; Tupper et al. 2015;

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Governance	50	Perception of APA performance	Whether people agree the APA is successful or effective	Key informant interviews/surveys		Dalton et al. 2012
Governance	51	Proportion of stakeholders trained in sustainable use	Number of stakeholders who participated in training and who have knowledge about sustainable resources uses	Key informant interviews/surveys; supporting document review		Beger et al. 2005; Camargo et al. 2009