**Table S4. Overview of the methods and indicators used to assess marine and coastal CES**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Cultural Ecosystem Services** | **Type of data** | **References** | **Type of Method** | **References** | **Quantification methods** | **References** | **Valuation methods** | | **References** | | **Mapping methods** | | **References** | | **Type of assessment** | | **References** | | **Indicators for quantification, valuation and/or mapping of CES** | | **References** | |
| **Recreation and leisure** | Primary | [1][2][3][4][5][6][7][8][9][10][11][12][13][14][15][16][17][18][19][20][21][22][23][24][25][26][27][28][29] | Quantitative | [1][30][2][31][9][32][11][13][16][20][21][22][26][27][33] | Questionnaire | [1][3][7][9][13][14][16][20][28] | Interview | | [34][4][6][10][25] | | GIS | | [30][31][32][10][26] | | Sociocultural | | [1][3][4][5][6][7][35][12][14][15][16][21][22][23][25][28][29] | | Quantification: no. of people visiting state and national parks | | [30] | |
| Secondary | [36][7][8][37][31][32][17][19][22][25][33] | Qualitative | [38][36][3][4][5][6][7][8][10][12][14][17][23][25][29] | Interview | [10][12][14][16] | Deliberative valuation | | [1][7][13][14][20] | | Expert opinion | | [7][8][13] | | Economic | | [37][9][32][11][17][18][20][24][33] | | Quantification: no. of respondents prefering water | | [3] | |
| Proxy | [34][30][38][2][39][36][32][11][35][13][14][22][24][26][27][28] | Mixed | [34][37][35][15][18][19][24][28] | Expert opinion | [36][19][22] | Contingent valuation | | [9][32][18][24] | | InVEST | | [2][35] | | Ecological | | [30][38][39][36] | | Quantification: no. areas of suitable bathing temperature and climatic comfort for coastal tourism | | [31] | |
| - | | | | Narrative-based | [30][31][21] | Questionnaire | | [4][5][24] | | Participatory | | [19] | | Sociocultural/ecological | | [2][31][13][19][26] | | Quantification: marine landscape (details on the type of substrate and marine habitats that scientists identified as of conservation importance; underwater objects (presence/absence: ship wreck, rock formation), sea life (presence/absence: large/specimen fish, grey/common seal, sea bird colony, octopus), access (accessible by: shore and boat; shore only, boat use prohibited; shore, boat, pier; site out at sea, only reachable by boat), other restrictions, vulnerable species protected, size of the protected area; travel distance | | [9] | |
| Images posted on image-hosting websites | [35] | Travel cost | | [34][9][17] | | Geo-tagged images posted on image-hosting websites | | [20][23] | | Sociocultural/economic | | [34] [8][10] | | Quantification: no. people traveling x admission price x emergy / money ratio for local province | | [11] | |
| Input-state-output | [11] | Perceptions survey | | [38][12] | | - | | | | Ecological/economic | | [27] | | Quantification: photos of winter sports, hiking, trekking, climbing, riding, camping, kayaking and sport fishing | | [35] | |
| - | | Expert opinion | | [36][19] | | - | | | | Quantification: no. visitors / season; total activity days for each user-group; activity days per active diver for each of the regions multiplied by regional population; total no. of passengers undertaking wildlife viewing trips; annual no. of visitors to the Royal Society for the Protection of Birds marine reserves | | [20] | |
| Workshop | | [8] | | Quantification: coastal tourism – tourist population; quality improvement of resident environment for local population | | [22] | |
| Q-methodology | | [15] | | Valuation: importance score | | [13] | |
| Media archives and recordings | | [25] | | Valuation: WTP mean value per angler-day\* angler effort ; WTP to avoid loss in salmon catch/year/household | | [32] | |
| Images posted on image-hosting websites | | [25] | | Valuation: importance score | | [14] | |
| Choice experiment | | [9] | | Valuation: factor analysis of statements in questionnaires | | [15] | |
| Benefit transfer | | [37] | | Valuation: bathing water quality – the average value of a day at the beach x the no. of beach visits | | [40] | |
| Market value | | [33] | | Valuation: Llikert-scale to rank importance | | [24] | |
| Maintenance cost | | [27] | | Valuation: WTP for maintaining CES | | [24] | |
| Cognitive hierarchy model | | [28] | | Valuation: comparison between archival photos and modern-day photos (Flickr); comparison between historical interviews and modern-day interviews | | [25] | |
| - | | | | Valuation: indispensability of CES according to a Likert-type scale | | [28] | |
| Valuation: recreation and ecotourism – income from tourism along the Yellow sea coast | | [33] | |
| Quantification/mapping: recreation and ecotourism – sum of no. nature recreation facilities (scenic view points, foot-paths, observation towers, bathing lakes, fishing areas, cycle paths, and associated amenities) per grid cell. Summed the points, the path lengths, and the area per grid cell of the different facilities and standardized the sums by ([value]/[mean])/[standard deviation]; summer cottages – sum of summer cottage area per grid; hunting – estimated roe deer density per grid cell from GPS registrations on roe deer killed in traffic | | [41] | |
| Valuation/mapping: relative value – the sum of the monetary, non-monetary or threat units assigned to the corresponding type of polygon (monetary, non-monetary, and threat) per interviewee | | [42] | |
| Mapping: spatial data on no. activities in a location: swimming at the beach, sea fishing, fishing village tourism, coastal visitors’ center, yachting, and scenic viewing | | [2] | |
| Mapping: density surface (points/ha) | | [7] | |
| Mapping: tourism – density of cultural tourist attractions; recreational navigation – intensity of recreational vessels’ navigation and anchorage | | [43] | |
| Mapping: no. and color of stickers from focus groups | | [23] | |
| **Aesthetic** | Primary | [44][2][3][4][45][5][7][8][9][10][12][46][16][18][23][24][25][28][29] | Quantitative | [30][2][7][9][16] | Questionnaire | [3][7][9][16] | Interview | | [34][4][10][25] | | GIS | | [30][10]  [2][35] | | Sociocultural | | [44][3][4][5][7][35][12][16][23][25][28][29] | | Quantification: level of "naturalness", computed via proximity to infrastructure and transport networks | | [30] | |
| Secondary | [36][7][8][37][25] | Qualitative | [44][38][36][3][4][45][5][8][10][12][23][25][29] | Interview | [10][12][16] | Contingent valuation | | [9][18][24] | | Expert opinion | | [7][8] | | Economic | | [37][9][18][24] | | Quantification: no scenic viewpoints | | [2] | |
| Proxy | [34][30][38][2][39][36][45][35][46][24][28] | Mixed | [34][37][35][46][18][24][28] | Expert opinion | [36] | Questionnaire | | [4][5][24] | | InVEST | | [46] | | Ecological | | [30][38][39][36][45][10] | | Quantification: abundance of Red Data Book or nationally scarce invertebrates; plant biodiversity; vegetation structure, grass:forb ratio & flowering | | [45] | |
| - | | | | Plant survey | [45] | Perceptions survey | | [44][7][12] | | Participatory | | [23] | | Sociocultural/ecological | | [2] | | Quantification: marine landscape (details on the type of substrate and marine habitats that scientists identified as of conservation importance; underwater objects (presence/absence: ship wreck, rock formation), sea life (presence/absence: large/specimen fish, grey/common seal, sea bird colony, octopus), access (accessible by: shore and boat; shore only, boat use prohibited; shore, boat, pier; site out at sea, only reachable by boat), other restrictions, vulnerable species protected, size of the protected area; travel distance | | [9] | |
| Images posted on image-hosting websites | [35] | Workshop | | [38][8] | | - | | | | Sociocultural/economic | | [34][8] | | Quantification: photos of natural and urban landscapes | | [35] | |
| - | | Choice experiment | | [34][9] | | Ecological/economic | | [46] | | Quantification: absence of salmon aquaculture net pens | | [46] | |
| Expert opinion | | [36] | | - | | | | Valuation: Llikert-scale to rank importance | | [24] | |
| Media archives and recordings | | [25] | | Valuation: WTP for maintaining CES | | [24] | |
| Images posted on image-hosting websites | | [25] | | Valuation: indispensability of CES according to a Likert-type scale | | [28] | |
| Travel cost | | [9] | | Valuation/mapping: relative value – the sum of the monetary, non-monetary or threat units assigned to the corresponding type of polygon (monetary, non-monetary, and threat) per interviewee | | [42] | |
| Benefit transfer | | [37] | | Mapping: density surface (points/ha) | | [7] | |
| Cognitive hierarchy model | | [28] | | Mapping: no. and color of stickers from focus groups | | [23] | |
| **Cultural heritage and identity** | Primary | [44][4][5][6][7][8][10]  [36][7][8][47][12][14][16][18][21][23][24][25][48][27][28] | Quantitative | [44][7][16][21][27] | Interview | [6][10][47][12][14][16] | Interview | | [34][4][10][47][25][48] | | Participatory | | [8][47][23] | | Sociocultural | | [44][4][5][6][7][35][12][14][16][21][23][25][48][28] | | Quantification: photos of heritage, folklore, traditions, art and local workers (ranching, forestry, artisanal fishing, mining, and oil extraction) | | [35] | |
| Secondary | [34][38][36][25] | Qualitative | [38][36][4][5][6][8][10][12][14][23][25][48] | Questionnaire | [7][14][16] | Perceptions survey | | [44][7][47][12] | | GIS | | [10][35] | | Economic | | [18][24] | | Valuation: species visibility, species population size, anchovy availability | | [4] | |
| Proxy | [35][14][24][27][28] | Mixed | [34][47][35][18][24][28] | Expert opinion | [36] | Questionnaire | | [4][5][24] | | - | | | | Ecological | | [38][36] | | Valuation: factor analysis of statements in questionnaires | | [15] | |
|  | | | | Narrative-based | [21] | Workshop | | [38][8] | | Sociocultural/economic | | [34][8][10][47] | | Valuation/mapping: relative value – the sum of the monetary, non-monetary or threat units assigned to the corresponding type of polygon (monetary, non-monetary, and threat) per interviewee | | [42] | |
| Images posted on image-hosting website | [35] | Contingent valuation | | [18][24] | | Ecological/economic | | [27] | | Valuation: importance score | | [14] | |
| - | | Expert opinion | | [36] | | - | | | | Valuation: Llikert-scale to rank importance | | [24] | |
| Deliberative valuation | | [14] | | Valuation: WTP for maintaining CES | | [24] | |
| Media archives and recordings | | [25] | | Valuation: comparison between archival photos and modern-day photos (Flickr); comparison between historical interviews and modern-day interviews | | [25] | |
| Images posted on image-hosting websites | | [25] | | Valuation: indispensability of CES according to a Likert-type scale | | [28] | |
| Choice experiment | | [34] | | Mapping: density surface (points/ha) | | [7] | |
| Maintenance cost | | [27] | | Mapping: presence and intensity of the following traditional activities - venetian rowing, lugsail sailing, artisanal fishing, extensive aquaculture practices and  cultivation of traditional crops | | [43] | |
| Cognitive hierarchy model | | [28] | | Mapping: no. and color of stickers from focus groups | | [23] | |
| **Spiritual, sacred and/or religious** | Primary | [44][49][5][6][7][10]  [36][7][47][12][14][15][16][18][21][23][25][28][29] | Quantitative | [7][16][21] | Interview | [6][10][12][14][16] | Perceptions survey | | [44][7][47][12] | | Participatory | | [47][23] | | Sociocultural | | [44][4][5][6][7][35][12][14][16][21][23][25][48][28] | | Valuation/mapping: relative value – the sum of the monetary, non-monetary or threat units assigned to the corresponding type of polygon (monetary, non-monetary, and threat) per interviewee | | [42] | |
| Secondary | [38][36][25] | Qualitative | [44][49][38][36][5][6][10][12][14][23][25][29] | Questionnaire | [49][7][14][16] | Interview | | [10][47][25] | | GIS | | [10] | | Economic | | [18][24] | | Valuation: importance score | | [14] | |
| Proxy | [14][28] | Mixed | [47][15][18][28] | Expert opinion | [36][47] | Expert opinion | | [49][36] | | - | | | | Ecological | | [38][36] | | Valuation: factor analysis of statements in questionnaires | | [15] | |
|  | | | | Narrative-based | [21] | Questionnaire | | [5] | | Sociocultural/economic | | [34][8][10][47] | | Valuation: indispensability of CES according to a Likert-type scale | | [28] | |
|  | | Workshop | | [38] | | Ecological/economic | | [27] | | Mapping: density surface (points/ha) | | [7] | |
| Deliberative valuation | | [14] | |  | | | | Mapping: no. and color of stickers from focus groups | | [23] | |
| Q-methodology | | [15] | |  | | | |
| Media archives and recordings | | [25] | |
| Contingent valuation | | [18] | |
| Cognitive hierarchy model | | [28] | |
| **Educational** | Primary | [6][7][8][10][47][12][16][18][21][23][24][25][27] | Quantitative | [7][16][21][27][33] | Interview | [10][47][12] | Interview | | [6][10][47][16][25] | | Participatory | | [8][47][23] | | Sociocultural | | [6][7][12][16][21][23][25] | | Valuation/mapping: relative value – the sum of the monetary, non-monetary or threat units assigned to the corresponding type of polygon (monetary, non-monetary, and threat) per interviewee | | [42] | |
| Secondary | [36][7][8][25][33] | Qualitative | [38][36][6][8][10][12][23][25] | Questionnaire | [7] | Perceptions survey | | [7][47][12] | | GIS | | [10] | | Economic | | [18][24][33] | | Valuation: Llikert-scale to rank importance | | [24] | |
| Proxy | [38][36][24][27] | Mixed | [47][18][24] | Narrative-based | [21] | Questionnaire | | [16][24] | | - | | | | Ecological | | [38][36] | | Valuation: WTP for maintaining CES | | [24] | |
| - | | | | | | | Workshop | | [38][8] | |  | | | | Sociocultural/economic | | [8][10][47] | | Valuation: comparison between archival photos and modern-day photos (Flickr); comparison between historical interviews and modern-day interviews | | [25] | |
| Contingent valuation | | [18][24] | | Ecological/economic | | [27] | | Valuation: RMB yuan/yr) = no. i education level, i present graduate students, college students, secondary vocational education students, and researchers (person) x energy transformity of i education level (sej/person/yr) / ration of energy to GDP (sej/$) x exchange rate of dollar - RMB yuan | | [33] | |
| Media archives and recordings | | [25] | | - | | | | Mapping: density surface (points/ha) | | [7] | |
| Images posted on image-hosting websites | | [25] | | Mapping: frequency of excursions with  environmental education purpose | | [43] | |
| Maintenance cost | | [27] | | Mapping: no. and color of stickers from focus groups | | [23] | |
| Market value | | [33] | |  | |  | |
| **Inspiration for culture, art and design** | Primary | [44][50][4][6][8][10]  [36][8][47][12][18][21][23][25][27][29] | Quantitative | [50][21][27] | Interview | [10][47][12] | Interview | | [4][10][47][25] | | Participatory | | [8][47][23] | | Sociocultural | | [44][4][6][12][21][23][25][29] | | Valuation: value of songs ($) x the number of dowloads | | [50] | |
| Secondary | [36][25] | Qualitative | [44][36][4][6][8][10][12][23][25][29] | Narrative-based | [21] | Perceptions survey | | [44][47][12] | | GIS | | [10] | | Economic | | [50][18] | | Valuation/mapping: relative value – the sum of the monetary, non-monetary or threat units assigned to the corresponding type of polygon (monetary, non-monetary, and threat) per interviewee | | [42] | |
| Proxy | [27] | Mixed | [47][18] | Expert opinion | [36] | Questionnaire | | [4] | | - | | | | Ecological | | [36] | | Valuation: comparison between archival photos and modern-day photos (Flickr); comparison between historical interviews and modern-day interviews | | [25] | |
| - | | | | Market value | [50] | Expert opinion | | [36] | | Sociocultural/economic | | [8][10][47] | | Mapping: no. and color of stickers from focus groups | | [23] | |
| - | | Workshop | | [8] | | Ecological/economic | | [27] | | - | | | |
| Media archives and recordings | | [25] | | - | | | |
| Images posted on image-hosting websites | | [25] | |
| Contingent valuation | | [18] | |
| Maintenance cost | | [27] | |
| **Sense of place** | Primary | [44][3][5][6][8][10][15][18][23][25][26][48][27][29] | Quantitative | [3][27] | Questionnaire | [3][5] | Interview | | [6][10][25][48] | | Participatory | | [8][23] | | Sociocultural | | [3][5][6][15][23][25][48][29] | | Valuation/mapping: relative value – the sum of the monetary, non-monetary or threat units assigned to the corresponding type of polygon (monetary, non-monetary, and threat) per interviewee | | [42] | |
| Secondary | [8][25][26] | Qualitative | [44][5][6][8][10][23][25][26][48][29] | Interview | [10] | Workshop | | [8] | | GIS | | [10][26] | | Economic | | [18] | | Valuation: comparison between archival photos and modern-day photos (Flickr); comparison between historical interviews and modern-day interviews | | [25] | |
| Proxy | [27] | Mixed | [15][18] | - | | Perceptions survey | | [44] | | - | | | | Sociocultural/economic | | [8][10] | | Quantification/mapping: the conservation area per grid cell | | [41] | |
| - | | | | Q-methodology | | [15] | | Sociocultural/ecological | | [26] | | Mapping: no. and color of stickers from focus groups | | [23] | |
| Media archives and recordings | | [25] | | Ecological/economic | | [27] | | - | | | |
| Images posted on image-hosting websites | | [25] | | - | | | |
| Contingent valuation | | [18] | |
| Maintenance cost | | [27] | |
| **Social relations** | Primary | [51][49][6][10][12][18][27] | Quantitative | [27] | Interview | [51][10][52][12] | Interview | | [6][10] | | GIS | | [10] | | Sociocultural | | [6][12] | | Quantification: Trust, community involvement, social cohesion - no. people from each village attending inter-village meetings | | [51][52] | |
| Secondary | [36] | Qualitative | [49][36][6][10][12] | Questionnaire | [49] | Expert opinion | | [49][36] | | - | | | | Economic | | [18] | | Valuation/mapping: relative value – the sum of the monetary, non-monetary or threat units assigned to the corresponding type of polygon (monetary, non-monetary, and threat) per interviewee | | [42] | |
| Proxy | [36][52][27] | Mixed | [51][52][18] | Focus group | [52] | Contingent valuation | | [52][18] | | Ecological | | [36] | | - | | | |
| - | | | | Expert opinion | [36] | Choice experiment | | [51][52] | | Sociocultural/economic | | [51][10][52] | |
| - | | Perceptions survey | | [12] | | Sociocultural/ecological | | [49] | |
| Ranking and rating | | [51] | | Ecological/economic | | [27] | |
| Maintenance cost | | [27] | |  | |  | |
| **Scientific** | Primary | [10][11][12][16][22] | Quantitative | [11][16][22][33] | Interview | [10][12][16] | Interview | | [10] | | GIS | | [10] | | Sociocultural | | [12][16][22] | | Quantification: no. pages published about yellow river x the emergy transformity of paper | | [11] | |
| Secondary | [22][33] | Qualitative | [38][10][12] | Questionnaire | [16] | Workshop | | [38] | | - | | | | Economic | | [11][33] | | Quantification: no. published papers | | [22] | |
| Proxy | [38][11][22] |  |  | Expert opinion | [22] | Perceptions survey | | [12] | | Ecological | | [38] | | Valuation: RMB yuan/yr) = no. pages research papers in Chinese) + ( no. pages research papers in English)) x solar transformaty of research paper (sej/page) / ration of energy to GDP (sej/$) x exchange rate of dollar - RMB yuan | | [33] | |
| - | | | | Input-state-output | [11] | Market value | | [33] | | Sociocultural/economic | | [10] | | - | | | |
| **Existence** | Primary | [26][27] | Quantitative | [27] | Images posted on image-hosting website | [35] | Workshop | | [38] | | GIS | | [35][26] | | Sociocultural | | [35] | | Quantification: photos of individual species of flora and fauna, both native and allochthonous | | [35] | |
| Secondary | [37] | Qualitative | [38][26] | - | | Maintenance cost | | [27] | | - | | | | Economic | | [37] | | Quantification/mapping: nature Appreciation: no. of sightings of species per grid cell submitted by people via the nature observation portal Fugle og Natur (www.fugleognatur.dk) | | [41] | |
| Proxy | [38][35][27] | Mixed | [37][35] | Benefit transfer | | [37] | | Ecological | | [38] | | - | | | |
| - | | | | - | | | | Sociocultural/ecological | | [26] | |
| Ecological/economic | | [27] | |
| **Bequest** | Primary | [6][47][21] | Quantitative | [21] | Interview | [47][52] | Interview | | [6][47] | | - | | - | | Sociocultural | | [6][21] | | Quantification: no. future generations able to live as Vezo (the "fishing people") | | [52] | |
| Proxy | [52] | Qualitative | [6] | Focus group | [52] | Perceptions survey | | [47] | | Expert opinion | | [19] | | Sociocultural/economic | | [47][52] | | - | | | |
| - | | Mixed | [47][52] | Narrative-based | [21] | Contingent valuation | | [52] | | Participatory | | [23] | | Sociocultural | | [12][23] | |
| - | | | | | Choice experiment | | [52] | | - | |  | | Sociocultural/ecological | | [49][19] | |  | | | |
| **Intellectual and representative interactions (group)** | Primary | [49][12][19][23] | Qualitative | [49][12][23] | Questionnaire | [49] | Expert opinion | | [49][19] | | Expert opinion | | [19] | | Sociocultural | | [12][23] | | Mapping: no. and color of stickers from focus groups | | [23] | |
| Secondary | [19] | Mixed | [19] | Interview | [12] | Perceptions survey | | [12] | | Participatory | | [23] | | Sociocultural/ecological | | [49][19] | | - | | | |
|  |  |  |  | Expert opinion | [19] | - | | | | | | | | - | | | |
| **Services to ecosystems** | Primary | [53] | Qualitative | [53] | Narratives and descriptions of field observations | [53] | - | | | | | | | | Sociocultural | | [53] | | - | | | |

**References:**

1. Ahtiainen H, Artell J, Czajkowski M, Hasler B, Hasselström L, Hyytiäinen K, et al. Public preferences regarding use and condition of the Baltic Sea—An international comparison informing marine policy. Mar Policy. 2013;42: 20–30. doi:http://dx.doi.org/10.1016/j.marpol.2013.01.011

2. Chung MG, Kang H, Choi S-U. Assessment of coastal ecosystem services for conservation strategies in South Korea. PLoS One. 2015;10. doi:10.1371/journal.pone.0133856

3. Faggi A, Breuste J, Madanes N, Gropper C, Perelman P. Water as an appreciated feature in the landscape: A comparison of residents’ and visitors’ preferences in buenos aires. J Clean Prod. Elsevier Ltd; 2013;60: 182–187. doi:10.1016/j.jclepro.2011.09.009

4. Fletcher R, Baulcomb C, Hall C, Hussain S. Revealing marine cultural ecosystem services in the Black Sea. Mar Policy. 2014;50: 151–161. doi:10.1016/j.marpol.2014.05.001

5. Gee K, Burkhard B. Cultural ecosystem services in the context of offshore wind farming: A case study from the west coast of Schleswig-Holstein. Ecol Complex. 2010;7: 349–358. doi:http://dx.doi.org/10.1016/j.ecocom.2010.02.008

6. Gould RK, Klain SC, Ardoin NM, Satterfield T, Woodside U, Hannahs N, et al. A protocol for eliciting nonmaterial values through a cultural ecosystem services frame. Conserv Biol. 2015;29: 575–586. doi:10.1111/cobi.12407

7. Hashimoto S, Nakamura S, Saito O, Kohsaka R, Kamiyama C, Tomiyoshi M, et al. Mapping and characterizing ecosystem services of social–ecological production landscapes: case study of Noto, Japan. Sustain Sci. 2015;10: 257–273. doi:10.1007/s11625-014-0285-1

8. Holt AR., Godbold JA., White PCL., Slater A-M., Pereira EG., Solan M. Mismatches between legislative frameworks and benefits restrict the implementation of the Ecosystem Approach in coastal environments. Mar Ecol Prog Ser. 2011;434: 213–228. doi:10.3354/meps09260

9. Jobstvogt N, Watson V, Kenter JO. Looking below the surface: The cultural ecosystem service values of UK marine protected areas (MPAs). Ecosyst Serv. Elsevier; 2014;10: 97–110. doi:10.1016/j.ecoser.2014.09.006

10. Klain SC, Chan KMA. Navigating coastal values: Participatory mapping of ecosystem services for spatial planning. Ecol Econ. 2012;82: 104–113. doi:10.1016/j.ecolecon.2012.07.008

11. Li M, Yang W, Sun T. Effects of Freshwater Releases on the Delivery of Ecosystem Services in Coastal Wetlands of the Yellow River Delta Using an Improved Input-State-Output Approach. Wetlands. Kluwer Academic Publishers; 2015; doi:10.1007/s13157-015-0630-x

12. de Oliveira LEC, Berkes F. What value São Pedro’s procession? Ecosystem services from local people’s perceptions. Ecol Econ. Elsevier B.V.; 2014;107: 114–121. doi:10.1016/j.ecolecon.2014.08.008

13. Outeiro L, Häussermann V, Viddi F, Hucke-Gaete R, Försterra G, Oyarzo H, et al. Using ecosystem services mapping for marine spatial planning in southern Chile under scenario assessment. Ecosyst Serv. Elsevier; 2015;16: 341–353. doi:10.1016/j.ecoser.2015.03.004

14. Outeiro L, Gajardo C, Oyarzo H, Ther F, Cornejo P, Villasante S, et al. Framing local ecological knowledge to value marine ecosystem services for the customary sea tenure of aboriginal communities in southern Chile. Ecosyst Serv. Elsevier; 2015;16: 354–364. doi:10.1016/j.ecoser.2015.04.004

15. Pike K, Wright P, Wink B, Fletcher S. The assessment of cultural ecosystem services in the marine environment using Q methodology. J Coast Conserv. Kluwer Academic Publishers; 2014; doi:10.1007/s11852-014-0350-z

16. Pleasant MM, Gray S a., Lepczyk C, Fernandes A, Hunter N, Ford D. Managing cultural ecosystem services. Ecosyst Serv. Elsevier; 2014;8: 141–147. doi:10.1016/j.ecoser.2014.03.006

17. Quilliam RS, Kinzelman J, Brunner J, Oliver DM. Resolving conflicts in public health protection and ecosystem service provision at designated bathing waters. J Environ Manage. 2015;161: 237–242. doi:http://dx.doi.org/10.1016/j.jenvman.2015.07.017

18. Garcia Rodrigues JM. Cultural services in aquatic ecosystems. Ecosystem Services and River Basin Ecohydrology. 2015. doi:10.1007/978-94-017-9846-4\_3

19. Rova S., Pranovi F., Müller F. Provision of ecosystem services in the lagoon of Venice (Italy): An initial spatial assessment. Ecohydrol Hydrobiol. Elsevier; 2015;15: 13–25. doi:10.1016/j.ecohyd.2014.12.001

20. Ruiz-Frau A, Hinz H, Edwards-Jones G, Kaiser MJ. Spatially explicit economic assessment of cultural ecosystem services: Non-extractive recreational uses of the coastal environment related to marine biodiversity. Mar Policy. 2013;38: 90–98. doi:http://dx.doi.org/10.1016/j.marpol.2012.05.023

21. Satterfield T, Gregory R, Klain S, Roberts M, Chan KM. Culture, intangibles and metrics in environmental management. J Environ Manage. 2013;117: 103–114. doi:10.1016/j.jenvman.2012.11.033

22. Shen C, Zheng W, Shi H, Ding D, Wang Z. Assessment and regulation of ocean health based on ecosystem services: Case study in the Laizhou Bay, China. Acta Oceanol Sin. 2015;34: 61–66. doi:10.1007/s13131-015-0777-6

23. Sousa LP., Lillebø AI., Gooch GD., Soares JA., Alves FL. Incorporation of local knowledge in the identification of Ria de Aveiro lagoon ecosystem services (Portugal). J Coast Res. 2013; 1051–1056. doi:10.2112/SI65-178

24. Soy-Massoni E, Langemeyer J, Varga D, Sáez M, Pintó J. The importance of ecosystem services in coastal agricultural landscapes: Case study from the Costa Brava, Catalonia. Ecosyst Serv. 2016;17: 43–52. doi:http://dx.doi.org/10.1016/j.ecoser.2015.11.004

25. Thiagarajah J, Wong SKM, Richards DR, Friess DA. Historical and contemporary cultural ecosystem service values in the rapidly urbanizing city state of Singapore. Ambio. 2015;44: 666–677. doi:10.1007/s13280-015-0647-7

26. Turner KG, Odgaard MV, Bøcher PK, Dalgaard T, Svenning J-C. Bundling ecosystem services in Denmark: Trade-offs and synergies in a cultural landscape. Landsc Urban Plan. 2014;125: 89–104. doi:10.1016/j.landurbplan.2014.02.007

27. Vaissière A-C., Levrel H., Hily C., Le Guyader D. Selecting ecological indicators to compare maintenance costs related to the compensation of damaged ecosystem services. Ecol Indic. 2013;29: 255–269. doi:10.1016/j.ecolind.2013.01.003

28. Wakita K, Shen Z, Oishi T, Yagi N, Kurokura H, Furuya K. Human utility of marine ecosystem services and behavioural intentions for marine conservation in Japan. Mar Policy. 2014;46: 53–60. doi:10.1016/j.marpol.2013.12.015

29. Willis C. The contribution of cultural ecosystem services to understanding the tourism–nature–wellbeing nexus. J Outdoor Recreat Tour. 2015;10: 38–43. doi:10.1016/j.jort.2015.06.002

30. Brandt P, Abson DJ, DellaSala DA, Feller R, von Wehrden H. Multifunctionality and biodiversity: Ecosystem services in temperate rainforests of the Pacific Northwest, USA. Biol Conserv. 2014;169: 362–371. doi:10.1016/j.biocon.2013.12.003

31. Ibret BU, Aydinozu D, Bastemur C. A geographic study on the effects of coastal tourism on sustainable development: Coastal tourism in Cide. Int J Sustain Dev World Ecol. 2013;20: 134–141. doi:10.1080/13504509.2012.743195

32. Jordan SJ., O’Higgins T., Dittmar JA. Ecosystem Services of Coastal Habitats and Fisheries: Multiscale Ecological and Economic Models in Support of Ecosystem-Based Management. Mar Coast Fish. 2012;4: 573–586. doi:10.1080/19425120.2012.703162

33. Wang Q, Song J, Zhou J, Zhao W, Liu H, Tang X. Temporal Evolution of the Yellow Sea Ecosystem Services (1980–2010). Heliyon. Elsevier Ltd; 2016;2: e00084. doi:10.1016/j.heliyon.2016.e00084

34. Baulcomb C, Fletcher R, Lewis A, Akoglu E, Robinson L, Almen A Von, et al. A pathway to identifying and valuing cultural ecosystem services : An application to marine food webs. Ecosyst Serv. Elsevier; 2014;11: 1–12. doi:10.1016/j.ecoser.2014.10.013

35. Martínez Pastur G, Peri PL, Lencinas M V, García-Llorente M, Martín-López B. Spatial patterns of cultural ecosystem services provision in Southern Patagonia. Landsc Ecol. 2015; doi:10.1007/s10980-015-0254-9

36. Everard M, Jones L, Watts B. Have we neglected the societal importance of sand dunes? An ecosystem services perspective. Aquat Conserv Mar Freshw Ecosyst. John Wiley & Sons, Ltd.; 2010;20: 476–487. doi:10.1002/aqc.1114

37. Hynes S., Norton D., Hanley N. Adjusting for Cultural Differences in International Benefit Transfer. Environ Resour Econ. 2013;56: 499–519. doi:10.1007/s10640-012-9572-4

38. Carollo C., Allee RJ., Yoskowitz DW. Linking the Coastal and Marine Ecological Classification Standard (CMECS) to ecosystem services: An application to the US Gulf of Mexico. Int J Biodivers Sci Ecosyst Serv Manag. 2013;9: 249–256. doi:10.1080/21513732.2013.811701

39. Davis J, Kidd IM. Identifying Major Stressors: The Essential Precursor to Restoring Cultural Ecosystem Services in a Degraded Estuary. ESTUARIES AND COASTS. 2012;35: 1007–1017. doi:10.1007/s12237-012-9498-7

40. Quilliam RS, Kinzelman J, Brunner J, Oliver DM. Resolving conflicts in public health protection and ecosystem service provision at designated bathing waters. J Environ Manage. 2015;161: 237–242. doi:10.1016/j.jenvman.2015.07.017

41. Turner KG, Odgaard MV, Bøcher PK, Dalgaard T, Svenning J-C. Bundling ecosystem services in Denmark: Trade-offs and synergies in a cultural landscape. Landsc Urban Plan. Elsevier; 2014;125: 89–104. doi:10.1016/j.landurbplan.2014.02.007

42. Klain SC, Chan KM a. Navigating coastal values: Participatory mapping of ecosystem services for spatial planning. Ecol Econ. Elsevier B.V.; 2012;82: 104–113. doi:10.1016/j.ecolecon.2012.07.008

43. Rova S, Pranovi F, Müller F. Provision of ecosystem services in the lagoon of Venice (Italy): an initial spatial assessment. Ecohydrol Hydrobiol. 2015;15: 13–25. doi:10.1016/j.ecohyd.2014.12.001

44. Burkhard B., Gee K. Establishing the resilience of a coastal-marine social-ecological system to the installation of offshore wind farms. Ecol Soc. 2012;17. doi:10.5751/ES-05207-170432

45. Ford H, Garbutt A, Jones DL, Jones L. Impacts of grazing abandonment on ecosystem service provision: Coastal grassland as a model system. Agric Ecosyst Environ. 2012;162: 108–115. doi:http://dx.doi.org/10.1016/j.agee.2012.09.003

46. Outeiro L, Villasante S. Linking salmon aquaculture synergies and trade-offs on ecosystem services to human wellbeing constituents. Ambio. 2013;42: 1022–1036. doi:10.1007/s13280-013-0457-8

47. Klain SC, Satterfield TA, Chan KMA. What matters and why? Ecosystem services and their bundled qualities. Ecol Econ. 2014;107: 310–320. doi:10.1016/j.ecolecon.2014.09.003

48. Urquhart J, Acott T. A Sense of Place in Cultural Ecosystem Services: The Case of Cornish Fishing Communities. Soc Nat Resour. 2014;27: 3–19. doi:10.1080/08941920.2013.820811

49. Butler JR a, Tawake A, Skewes T, Tawake L, Mcgrath V. Integrating Traditional Ecological Knowledge and Fisheries Management in the Torres Strait , Australia : the Catalytic Role of Turtles and Dugong. Ecol Soc. 2012;17: 1–19. doi:10.5751/ES-05165-170434

50. Coscieme L. Cultural ecosystem services: The inspirational value of ecosystems in popular music. Ecosyst Serv. Elsevier; 2015;16: 121–124. doi:10.1016/j.ecoser.2015.10.024

51. Barnes-Mauthe M, Oleson KLL, Brander LM, Zafindrasilivonona B, Oliver TA, van Beukering P. Social capital as an ecosystem service: Evidence from a locally managed marine area. Ecosyst Serv. 2014; doi:http://dx.doi.org/10.1016/j.ecoser.2014.10.009

52. Oleson KLL, Barnes M, Brander LM, Oliver TA, van Beek I, Zafindrasilivonona B, et al. Cultural bequest values for ecosystem service flows among indigenous fishers: A discrete choice experiment validated with mixed methods. Ecol Econ. 2015;114: 104–116. doi:http://dx.doi.org/10.1016/j.ecolecon.2015.02.028

53. Comberti C, Thornton TF, Echeverria VW, Patterson T. Ecosystem services or services to ecosystems? Valuing cultivation and reciprocal relationships between humans and ecosystems. Glob Environ Chang. 2015;34: 247–262. doi:http://dx.doi.org/10.1016/j.gloenvcha.2015.07.007