

Ecosystem Service	Surface water for drinking
CICES class name	Surface water for drinking
CICES Section	Provisioning (Abiotic)
CICES Class code	4.2.1.1

Sample Indicators









Indicator values from			
Experiment or direct measurement		Survey	
Expert assessment		Statistical- or census data	
Model or GIS		Literature values	
Stakeholder participation		Not provided	

Table 1: Field Scale


Indicator	Unit	Indicator values from
^[1] Annual total drainage	mm	

Table 2: Farm Scale







Indicator	Unit	Indicator values from
^[2] Mean annual water flow	$\text{m}^3 * \text{s}^{-1} * \text{ha}^{-1}$	
^[3] Streamflow calculated by SWAT model	$\text{m}^3 * \text{time}^{-1}$	
^[3] Surface runoff calculated by application of ECOSER protocol (www.eco-ser.com.ar)	$\text{m}^3 * \text{ha}^{-1}$	

Table 3: Regional Scale

Indicator	Unit	Indicator values from
^[1] Annual total drainage	mm	
^[5, 12] Precipitation – evapotranspiration, calculated with InVEST model)	$\text{m}^3 * \text{ha}^{-1} * \text{yr}^{-1}$	
^[7] Surface water yield: mean annual precipitation - mean annual evapotranspiration; calculated with InVEST model.	mm	





















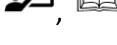


[13] Water yield: calculated as annual precipitation - evapotranspiration	$m^3 * area^{-1} * yr^{-1}$	
[11] Potential water yield, calculated as precipitation - evapotranspiration	mm	
[16] Provisioning of water: Groundwater recharge rate calculated from water balance	mm	
[14] Annual average water yield	$mm * yr^{-1}$	
[14] Annual sectoral water yield (e.g., domestic, agriculture and industry)	$mm * yr^{-1}$	
[8] Runoff: renewable water supply. Values were normalized [0-1] using benchmark values where available and observed values otherwise.	mm	
[14] Annual river runoff	$m^3 * yr^{-1}$	
[15] Annual water flow that is available from surface waters	$mm * yr^{-1}, m^3 * yr^{-1}$	
[14] Water level	m	
[14] Number of extreme (runoff) events	$\# * yr^{-1}$	
[14] Annual average sediment in rivers	$t * yr^{-1}$	
[14] Total dissolved solids	$mg * l^{-1}$	
[14] Leakage of nutrients	$kg * ha^{-1} * yr^{-1}$	
[9] Surface area of water bodies	ha	
[9] Number of traditional water sources	#	
[6] Freshwater supply: values for land cover classes. The matrix by Burkhard et al., 2012 (DOI:10.1016/j.ecolind.2011.06.019) was adapted and used in this study.	Index 0 - 5	
[10] Water for drinking and non-drinking uses: expert based index for ecosystem service supply by land cover class [1-5], multiplied by the area of the land cover class	km^2	
[10] Water for drinking and non-drinking uses' value: expert based index for ecosystem service supply by land cover class [1-5], multiplied by the area of the land cover class and a literature-based monetary value of ES	$km^2, \$ * ha^{-1} * yr^{-1}$	
[11] Rating of current service supply per land use class by expert-stakeholders	Rating 0 - 10	
[11] Rating of increases/decreases of service provision in scenarios, relative to the status quo	%	
[17] Water purification and provision: $W = NPP * (1 - VCNPP) * IC_s * S_{cf} * 1.75$ With: W – water purification and provision, NPP – Net Primary Production [0-1000], VCNPP – coefficient of variation of NPP [0–1], IC_s – soil infiltration capacity [0–1], S_{cf} – “slope average” correction factor of the study area [0–1]		

Table 4: National Scale




Indicator	Unit	Indicator values from
[18] Supply and demand of drinking water, calculated by multiplying modelled average surface water runoff by the number of people living downstream and the average estimated domestic water use	m ³ * yr ⁻¹	
[19] High Nature Value farmland	Not specified	

Table 5: Multinational Scale

Indicator	Unit	Indicator values from
[20] Freshwater: values for Corine land cover classes based on values published by Burkhard et al. (2009; DOI: 10.3097/LO.200915) and modified for the context of riparian zones.	Index 0 - 5	

References

No.	Citation
1	Qiu JX, Carpenter SR, Booth EG, Motew M, Zipper SC, Kucharik CJ, Loheide SP, Turner AG (2018) Understanding relationships among ecosystem services across spatial scales and over time. <i>Environmental Research Letters</i> 13(5): 054020. DOI: 10.1088/1748-9326/aabb87
2	Andersson E, Nykvist B, Malinga R, Jaramillo F, Lindborg R (2015) A social–ecological analysis of ecosystem services in two different farming systems. <i>Ambio</i> 44(1): 102-112. DOI: 10.1007/s13280-014-0603-y
3	Nahuelhual L, Benra F, Laterra P, Marin S, Arriagada R, Jullian C (2018) Patterns of ecosystem services supply across farm properties: Implications for ecosystem services-based policy incentives. <i>Science of the Total Environment</i> 634: 941-950. DOI: 10.1016/j.scitotenv.2018.04.042
4	Palomo I, Martin-Lopez B, Zorrilla-Miras P, Del Amo DG, Montes C (2014) Deliberative mapping of ecosystem services within and around Donana National Park (SW Spain) in relation to land use change. <i>Regional Environmental Change</i> 14(1): 237-251. DOI: 10.1007/s10113-013-0488-5
5	Zarandian A, Baral H, Stork NE, Ling MA, Yavari AR, Jafari HR, Amirnejad H (2017) Modeling of ecosystem services informs spatial planning in lands adjacent to the Sarvelat and Javaherdasht protected area in northern Iran. <i>Land Use Policy</i> 61: 487-500. DOI: 10.1016/j.landusepol.2016.12.003
6*	Zhang ZM, Gao JF, Fan XY, Lan Y, Zhao MS (2017) Response of ecosystem services to socioeconomic development in the Yangtze River Basin, China. <i>Ecological Indicators</i> 72: 481-493. DOI: 10.1016/j.ecolind.2016.08.035
7	Früh-Müller A, Hotes S, Breuer L, Wolters V, Koellner T (2016) Regional patterns of ecosystem services in cultural landscapes. <i>Land</i> 5(2): 17. DOI: 10.3390/land5020017
8	Rodríguez-Loinaz G, Alday JG, Onaindia M (2015) Multiple ecosystem services landscape index: A tool for multifunctional landscapes conservation. <i>Journal of Environmental Management</i> 147: 152-163. DOI: 10.1016/j.jenvman.2014.09.001
9	Adhikari S, Baral H, Nitschke CR (2018) Identification, Prioritization and Mapping of Ecosystem Services in the Panchase Mountain Ecological Region of Western Nepal. <i>Forests</i> 9(9): 554. DOI: 10.3390/f9090554
10	Huq N, Bruns A, Ribbe L (2019) Interactions between freshwater ecosystem services and land cover changes in southern Bangladesh: A perspective from short-term (seasonal) and long-term (1973-2014) scale. <i>Science of the Total Environment</i> 650: 132-143. DOI: 10.1016/j.scitotenv.2018.08.430
11	Koo H, Kleemann J, Fürst C (2018) Land use scenario modeling based on local knowledge for the provision of ecosystem services in northern Ghana. <i>Land</i> 7(2): 59. DOI: 10.3390/land7020059
12	Li T, Lü Y, Fu B, Hu W, Comber AJ (2019) Bundling ecosystem services for detecting their interactions driven by large-scale vegetation restoration: enhanced services while depressed synergies. <i>Ecological Indicators</i> 99: 332-342. DOI: 10.1016/j.ecolind.2018.12.041
13	Peng J, Tian L, Liu Y, Zhao M, Hu Y, Wu J (2017) Ecosystem services response to urbanization in metropolitan areas: Thresholds identification. <i>Science of the Total Environment</i> 607-608: 706-714. DOI: 10.1016/j.scitotenv.2017.06.218
14	Pham HV, Torresan S, Critto A, Marcomini A (2019) Alteration of freshwater ecosystem services under global change - A review focusing on the Po River basin (Italy) and the Red River basin (Vietnam). <i>Science of the Total Environment</i> 652: 1347-1365. DOI: 10.1016/j.scitotenv.2018.10.303

* The ecosystem service discussed on this factsheet is not a focus of the cited paper

No.	Citation
15	Santos-Martín F, Zorrilla-Miras P, Palomo-Ruiz I, Montes C, Benayas J, Maes J (2019) Protecting nature is necessary but not sufficient for conserving ecosystem services: A comprehensive assessment along a gradient of land-use intensity in Spain. <i>Ecosystem Services</i> 35: 43-51. DOI: 10.1016/j.ecoser.2018.11.006
16	Kay S, Crous-Duran J, Ferreiro-Domínguez N, García de Jalón S, Graves A, Moreno G, Mosquera-Losada MR, Palma JHN, Rocas-Díaz JV, Santiago-Freijanes JJ, Szerencsits E, Weibel R, Herzog F (2018) Spatial similarities between European agroforestry systems and ecosystem services at the landscape scale. <i>Agroforestry Systems</i> 92(4): 1075-1089. DOI: 10.1007/s10457-017-0132-3
17	Barral MP, Oscar MN (2012) Land-use planning based on ecosystem service assessment: A case study in the Southeast Pampas of Argentina. <i>Agriculture, Ecosystems and Environment</i> 154: 34-43. DOI: 10.1016/j.agee.2011.07.010
18	Neugarten RA, Honzak M, Carret P, Koenig K, Andriamaro L, Cano CA, Grantham HS, Hole D, Juhn D, McKinnon M, Rasolohery A, Steininger M, Wright TM, Turner WR (2016) Rapid Assessment of Ecosystem Service Co-Benefits of Biodiversity Priority Areas in Madagascar. <i>PLoS One</i> 11(12): e0168575. DOI: 10.1371/journal.pone.0168575
19	Maes J, Liqueste C, Teller A, Erhard M, Paracchini ML, Barredo JI, Grizzetti B, Cardoso A, Somma F, Petersen JE, Meiner A, Gelabert ER, Zal N, Kristensen P, Bastrup-Birk A, Biala K, Piroddi C, Egoh B, Degeorges P, Fiorina C, Santos-Martín F, Naruševičius V, Verboven J, Pereira HM, Bengtsson J, Gocheva K, Marta-Pedroso C, Snäll T, Estreguil C, San-Miguel-Ayanz J, Pérez-Soba M, Grêt-Regamey A, Lillebø AI, Malak DA, Condé S, Moen J, Czucz B, Drakou EG, Zulian G, Laval C (2016) An indicator framework for assessing ecosystem services in support of the EU Biodiversity Strategy to 2020. <i>Ecosystem Services</i> 17: 14-23. DOI: 10.1016/j.ecoser.2015.10.023
20	Clerici N, Paracchini ML, Maes J (2014) Land-cover change dynamics and insights into ecosystem services in European stream riparian zones. <i>Ecohydrology and Hydrobiology</i> 14(2): 107-120. DOI: 10.1016/j.ecohyd.2014.01.002