

Supplement

Table S1. Overview of modelled soil erosion rates (SE) from collected studies compared with our results.

Study area	Other studies			This study		
	Time series	Average SE (t·ha ⁻¹ ·a ⁻¹)	Resolution*	Time series	Average SE (t·ha ⁻¹ ·a ⁻¹)	Resolution
Yangtze River Basin						
Jiangxi Province	2001, 2015	63.75–70.42 (Zhou et al., 2018)	1 km		40.69–77.44 (2001, 2015)	
	2010	353.54 (Chen et al., 2014)	1 km		73.31	
	2000, 2005, 2010, 2015	90.60 (Li et al., 2021)	1 km		73.31	
	Average of 2002–2016	0.92 (Teng et al., 2019)	1 km		48.01	
Hunan Province	2010	558.24 (Chen et al., 2014)	1 km	1992-2019	109.01	300 m
The southern hill region of	2010	421.81 (Chen et al., 2014)	1 km		84.86	
China	2000, 2005, 2010, 2015	108.20 (Li et al., 2021)	1 km			
South of Gansu and northwest	2015	13.39 (Wei et al., 2021a)	1 km		43.65	
of Sichuan	2000, 2005, 2010, 2015	11.53 (Li et al., 2021)	1 km			

Southeast Basin

Fujian Province	2010	298.71 (Chen et al., 2014)	1 km		80.47	
	Average of 2002–2016	5.07 (Teng et al., 2019)	1 km			
	1990, 2000, 2010, 2015	15-30 (Zeng et al., 2017)	30 m (DEM)	1992-2019	60.35	300 m
Zhejiang Province	2010	395.02 (Chen et al., 2014)	1 km		58.01	
	Average of 2002–2016	1.21 (Teng et al., 2019)	1 km		43.39	
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Pearl River Basin						
Guangdong Province	2012	22.94 (Gao et al., 2017)	500 m		116.42	
	Average of 2002–2016	1.88 (Teng et al., 2019)	1 km		112.63	
	2000, 2005, 2010, 2015	115.19 (Li et al., 2021)	1 km	1992-2019	122.88	300 m
Guizhou Province	2002	28.7 (Xu et al., 2008)	25 m		206.66	
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Yellow River Basin						
Loess Plateau	2008	24.05 (Fu et al., 2011)	30 m (DEM)			
	Average of 1991-1995	10.13 (Jin et al., 2021)	30 m		15.56	
	Average of 2011-2015	5.95 (Jin et al., 2021)	30 m			
	2000, 2005, 2010, 2015	8.27 (Li et al., 2021)	1 km	1992-2019		300 m
Gansu Province	-	15.00 (Zhang and McBean, 2016)			12.07	
	Average of 2002–2016	1.72 (Teng et al., 2019)	1 km			
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Shaanxi Province	2006	41.74–43.34 (Cheng et al., 2009)			35.31
	Average of 2002–2016	2.78 (Teng et al., 2019)	1 km		
Continental Basin					
Three-North Shelter Forest Region	2015	2.30 (Ji et al., 2018)			1.78
Tibet Plateau	Average of 1990–2000	40.5 (Xiao et al., 2003)	1 km	1992-2019	300 m
	Average of 2002–2016	2.76 (Teng et al., 2018)	1 km		11.67
	-	0.18–114.98 (Wei et al., 2021b)	-		
Songhua and Liaohe River Basin					
Liaoning Province	Average of 2016–2020	18.73 (Li, 2022)	1 km		18.84
	Average of 2002–2016	0.45 (Teng et al., 2019)	1 km		
Jilin Province	2005	17.70 (Zhao, 2018)	90 m		11.71
	2010	18.25 (Zhao, 2018)	90 m		13.91
	2015	14.33 (Zhao, 2018)	90 m	1992-2019	300 m
	Average of 2002–2016	0.13 (Teng et al., 2019)	1 km		9.13
Black Soil Region	1980, 1990, 2000, 2010,	3.91–4.45 (mean=4.22) (Fang and	90 m (DEM)		6.82
	2017	Fan, 2020)			

China	2001, 2012	6.42 (Borrelli et al., 2017)	25 km		25.78	
	2000, 2005, 2010, 2015	35.98 (Li et al., 2021)	1 km			
	Average of 2002–2016	1.44 (Teng et al., 2019)	1 km	1992–2019	30.40	300 m
	2018	64.88–81.75 (Zhuang et al., 2021)	10 km		34.16	

* The data resolution refers to the resolution of final results of soil erosion estimation. If this information is missed, it will be replaced by the resolution of the DEM data.

Table S2. Overview of collected soil conservation capacity (SC) in different regions and their sources compared with our results.

Study area	Other studies			This study		
	Time	Average SC (t ha ⁻¹ a ⁻¹)	Resolution*	Time	Average SC (t ha ⁻¹ a ⁻¹)	Resolution
China	2009	224.42 (Rao et al., 2013)	90 m		433.45	
Tibet Plateau	Average of 1990–2000	61.9–598.3 (mean value=483.03) (Xiao et al., 2003)	1 km		161.35	
Three Gorges Reservoir region of China	2000–2010	2134.73 (Xiao et al., 2017)	90 m	1992–2019	2132.81	300 m
Hainan Island	2008	247.28 (Rao et al., 2013)	90 m (DEM)		1117.01	

Agro-pastoral ecotone of northern China	2000, 2008	459.03–459.40 (Liu et al., 2021)	90 m (DEM)	177.09
Liaoning Province	Average of 2016–2020	186.15–194.35 (Li, 2022)	1 km	321.43
Xinjiang Province	1996–2012	8.09–8.17 (Ma et al., 2020)	1 km	7.05
Yangtze River Basin	2000, 2015	3082–3164 (Kong et al., 2018)	90 m (DEM)	2515.09

* The data resolution refers to the resolution of final results of soil conservation capacity. If this information is missed, it will be replaced by the resolution of the DEM data.

Reference:

- Borrelli, P., Robinson, D. A., Fleischer, L. R., Lugato, E., Ballabio, C., Alewell, C., Meusburger, K., Modugno, S., Schutt, B., Ferro, V., Bagarello, V., Oost, K. V., Montanarella, L., and Panagos, P.: An assessment of the global impact of 21st century land use change on soil erosion, *Nature Communications*, 8, 2013, <https://doi.org/10.1038/s41467-017-02142-7>, 2017.
- Chen, S., Yang, X., Xiao, L., and Cai, H.: Study of soil erosion in the southern hillside area of China based on RUSLE model, *Resources Science*, 36, 1288-1297, 2014.
- Cheng, L., Yang, Q., Xie, H., Wang, C., and Guo, W.: GIS and CSLE based quantitative assessment of soil erosion in Shaanxi, China, *Journal of Soil and Water Conservation*, 23, 61-66, <https://doi.org/10.13870/j.cnki.stbcbx.2009.05.022>, 2009.
- Fang, H. Y., and Fan, Z. M.: Assessment of Soil Erosion at Multiple Spatial Scales Following Land Use Changes in 1980-2017 in the Black Soil Region, (NE) China, *International Journal of Environmental Research and Public Health*, 17, <https://doi.org/10.3390/ijerph17207378>, 2020.
- Fu, B., Liu, Y., Lu, Y., He, C., Zeng, Y., and Wu, B.: Assessing the soil erosion control service of ecosystems change in the Loess Plateau of China, *Ecological Complexity*, 8, 284-293, <https://doi.org/10.1016/j.ecocom.2011.07.003>, 2011.
- Gao, F., Wang, Y. P., and Yang, J. X.: Assessing soil erosion using USLE model and MODIS data in the Guangdong, China, 3rd International Symposium on Earth Observation for Arid and Semi-Arid Environments, 74, <https://doi.org/10.1088/1755-1315/74/1/012007>, 2017.
- Ji, C., Li, X., Jia, Y., and Wang, L.: Dynamic Assessment of Soil Water Erosion in the Three-North Shelter Forest Region of China from 1980 to 2015, *Eurasian Soil Science*, 51, 1533-1546, <https://doi.org/10.1134/s1064229318120050>, 2018.

- Jin, F. M., Yang, W. C., Fu, J. X., and Li, Z.: Effects of vegetation and climate on the changes of soil erosion in the Loess Plateau of China, *Science of The Total Environment*, 773, <https://doi.org/10.1016/j.scitotenv.2021.145514>, 2021.
- Kong, L., Zheng, H., Rao, E., Xiao, Y., Ouyang, Z., and Li, C.: Evaluating indirect and direct effects of eco-restoration policy on soil conservation service in Yangtze River Basin, *Science of The Total Environment*, 631-632, 887-894, <https://doi.org/https://doi.org/10.1016/j.scitotenv.2018.03.117>, 2018.
- Li, J. L., Sun, R. H., Xiong, M. Q., and Chen, L. D.: Methodology of Time Series of Soil Erosion Dataset in Water Erosion Area of China in Five-year Increments (2000-2015), *Journal of Global Change Data & Discovery*, 5, 203-212, 2021.
- Li, M.: Evaluation of functional importance of soil and water conservation in Liaoning Province, *Heilongjiang Hydraulic Science and Technology*, 50, 215-218, <https://doi.org/10.14122/j.cnki.hskj.2022.02.059>, 2022.
- Liu, M., Zhang, H., Ren, H., and Pei, H.: Spatiotemporal Variations of the Soil Conservation in the Agro-pastoral Ecotone of Northern China Under Grain for Green Program, *Research of Soil and Water Conservation*, 28, 172-178, <https://doi.org/10.13869/j.cnki.rswc.2021.05.020>, 2021.
- Ma, X., Zhu, J., Yan, W., and Zhao, C.: Assessment of soil conservation services of four river basins in Central Asia under global warming scenarios, *Geoderma*, 375, 114533, <https://doi.org/https://doi.org/10.1016/j.geoderma.2020.114533>, 2020.
- Rao, E., Xiao, Y., Ouyang, Z., and Zheng, H.: Spatial characteristics of soil conservation service and its impact factors in Hainan Island, *Acta Ecologica Sinica*, 33, 746-755, 2013.
- Teng, H., Liang, Z., Chen, S., Liu, Y., Viscarra Rossel, R. A., Chappell, A., Yu, W., and Shi, Z.: Current and future assessments of soil erosion by water on the Tibetan Plateau based on RUSLE and CMIP5 climate models, *Science of The Total Environment*, 635, 673-686, <https://doi.org/https://doi.org/10.1016/j.scitotenv.2018.04.146>, 2018.
- Teng, H. F., Hu, J., Zhou, Y., Zhou, L. Q., and Shi, Z.: Modelling and mapping soil erosion potential in China, *Journal of Integrative Agriculture*, 18, 251-264, [https://doi.org/10.1016/s2095-3119\(18\)62045-3](https://doi.org/10.1016/s2095-3119(18)62045-3), 2019.
- Wei, J., Li, C., Wu, L., Xie, X., Lv, J., and Zhou, X.: Study on soil erosion in Northwestern Sichuan and Southern Gansu (NSSG) based on USLE, *Journal of Soil and Water Conservation*, 35, 31-37+46, 2021a.
- Wei, M., Fu, S., and Liu, B.: Quantitative research of water erosion in the Qinghai-Tibet Plateau, *Advances in Earth Science*, 1-13, 2021b.
- Xiao, Q., Hu, D., and Xiao, Y.: Assessing changes in soil conservation ecosystem services and causal factors in the Three Gorges Reservoir region of China, *Journal of Cleaner Production*, 163, S172-S180, <https://doi.org/https://doi.org/10.1016/j.jclepro.2016.09.012>, 2017.
- Xiao, Y., Xie, G., and An, K.: The function and economic value of soil conservation of ecosystems in Qinghai-Tibet Plateau, *Acta Ecologica Sinica*, 2367-2378, 2003.
- Xu, Y.-Q., Shao, X.-M., Kong, X.-B., Peng, J., and Cai, Y.-L.: Adapting the RUSLE and GIS to model soil erosion risk in a mountains karst watershed, Guizhou Province, China, *Environmental Monitoring and Assessment*, 141, 275-286, <https://doi.org/10.1007/s10661-007-9894-9>, 2008.

- Zeng, S., Wang, Z., Wang, X., Lin, J., Chen, X., and Chen, S.: Temporal and spatial variation of soil erosion in Fujian province, *Bulletin of Soil and Water Conservation*, 37, 305-312+320, <https://doi.org/10.13961/j.cnki.stbctb.2017.06.050>, 2017.
- Zhang, C., and McBean, E. A.: Estimation of desertification risk from soil erosion: a case study for Gansu Province, China, *Stochastic Environmental Research and Risk Assessment*, 30, 2215-2229, <https://doi.org/10.1007/s00477-015-1186-2>, 2016.
- Zhao, M. Quantitative study on hydraulic soil erosion in Jilin province based on RUSLE model. Master. China University of Geosciences (Beijing).2018.
- Zhou, X., Ma, G., Cao, G., Yu, F., Zhou, Y., Jia, Q., and Zhang, Y.: Soil erosion changes in Jiangxi Province from 2001 to 2015 based on USLE model, *Bulletin of Soil and Water Conservation*, 38, 8-11+17+12, 2018.
- Zhuang, H., Wang, Y., Liu, H., Wang, S., Zhang, W., Zhang, S., and Dai, Q.: Large-Scale Soil Erosion Estimation Considering Vegetation Growth Cycle, *Land*, 10, 473, 2021.