Table 1. Summary of C stocks, accumulation rates, and emission fluxes in global tidal flat studies

| Site | Country | Latitude  (°) | Longitude  (°) | Time | Soil temperature (℃) | Salinity (‰) | | SOC (g kg-1) | C stock  (0-100cm)  (Mg C ha-1) | C accumulation rates  (g C m-2 yr-1) | CO2 emission fluxes (mg CO2 m-2 d-1) | CH4 emission fluxes (mg CH4 m-2 d-1) | Sediment type | Reference |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Global |  |  | 1984-2016 |  | |  |  | 1148 |  |  |  |  | (Murray et al., 2019) |
|  | Global |  |  |  |  | |  |  | 86.3 | 129.8 |  |  |  | (Chen and Lee, 2022b) |
| Island of Askö | Sweden | 58.82 | 17.64 | May 2020 |  | | 6.6-7 |  |  |  | -27.4 | 0.1 | Unknown | (Roth et al.) |
|  |  |  |  | July 2020 |  | |  |  |  |  | 184.0 | 1.5 |  |  |
|  |  |  |  | Oct 2020 |  | |  |  |  |  | -98.1 | 2.1 |  |  |
|  |  |  |  | Nov 2020 |  | |  |  |  |  | 274.7 | 0.0 |  |  |
| Squamish Central Estuary | Canada | 49.69 | -123.18 | June 2016 | 12.4 | | 35 |  |  |  | 211.9 |  | Mixed | (Diggle et al., 2019) |
| St. Lawrence estuary | Canada | 47.37 | -70.057 | Aug 2020 | 19.6 | | 13 | 15 |  |  | 5253.6 | 3.2 | Mud | (Comer-Warner et al., 2022) |
| Santander Bay East\_1 | Atlantic coast of Europe | 43.43 | -3.76 | 2019 |  | |  |  | 150.3 | 47.5 |  |  | Mud | (Mazarrasa et al., 2023) |
| Santander Bay West\_2 |  | 43.45 | -3.77 |  |  | |  |  | 85.9 |  |  |  | Sand |  |
| Santoña Marshes 1 |  | 43.37 | -3.43 |  |  | |  |  | 178.3 | 46.4 |  |  | Mud |  |
| Santoña Marshes 3 |  | 43.45 | -3.49 |  |  | |  |  | 170.0 | 13.2 |  |  | Mud |  |
| Mondego estuary 1 |  | 40.12 | -8.77 |  |  | |  |  | 174.9 |  |  |  | Mixed |  |
| Mondego estuary 2 |  | 40.14 | -8.81 |  |  | |  |  | 180.1 | 32.0 |  |  | Mud |  |
| Mondego estuary 3 |  | 40.13 | -8.85 |  |  | |  |  | 195.7 |  |  |  | Mixed |  |
| Western Scheldt\_1 |  | 51.36 | 4.25 |  |  | |  |  | 226.0 |  |  |  | Mixed |  |
| Western Scheldt\_2 |  | 51.40 | 4.16 |  |  | |  |  | 12.1 |  |  |  | Mud |  |
| Western Scheldt\_3 |  | 51.39 | 3.82 |  |  | |  |  | 113.0 |  |  |  | Mud |  |
| Western Scheldt\_4 |  | 51.35 | 3.72 |  |  | |  |  | 137.1 |  |  |  | Sand |  |
| Oyambre East\_1 |  | 43.37 | -4.32 | 2018 |  | |  |  | 91.5 | 5.9 |  |  | Mud |  |
| Oyambre West\_1 |  | 43.38 | -4.36 |  |  | |  |  | 236.9 |  |  |  | Mud |  |
| Oyambre West\_2 |  | 43.38 | -4.32 |  |  | |  |  | 199.9 | 67.3 |  |  | Mixed |  |
| Wadden Sea | Netherlands | 53.41 | 6.34 | 2006-2007 | 11.6 | |  |  |  |  | 42.2 |  | Mixed | (Klaassen and Spilmont, 2012) |
| Wadden Sea |  |  |  | 2007-2008 | 10.3 | |  |  |  |  | -191.7 |  |  |  |
| Wadden Sea |  |  |  | 2008-2009 | 9.7 | |  |  |  |  | -86.8 |  |  |  |
| Westerschelde Estuary | Netherlands | 51.44 | 3.95 | 1996-1997 |  | |  | 1.5 |  | 42.0 |  |  | Sand | (Widdows et al., 2004) |
| Westerschelde Estuary |  | 51.44 | 3.95 |  |  | |  | 3.0 |  | 88.0 |  |  | Mixed |  |
| Westerschelde Estuary |  | 51.44 | 3.95 |  |  | |  | 2.8 |  | 105.0 |  |  | Sand |  |
| Westerschelde Estuary |  | 51.44 | 3.95 |  |  | |  | 0.9 |  | 21.0 |  |  | Sand |  |
| Westerschelde Estuary |  | 51.44 | 3.95 |  |  | |  | 0.6 |  | 10.0 |  |  | Sand |  |
| Arcachon Bay | France | 44.72 | -1.1 | Mar 2005 |  | |  |  |  |  | -1418.8 |  | Sand | (Migne et al., 2016) |
|  |  |  |  | May 2006 |  | |  |  |  |  | -4424.7 |  |  |  |
|  |  |  |  | Sep 2007 |  | |  |  |  |  | -4156.8 |  |  |  |
| Arcachon lagoon | France | 44.67 | -1.17 | Mar 2005 |  | |  |  |  |  |  | 4.8 | Mud | (Deborde et al., 2010) |
| Arcachon lagoon | France |  |  | May 2006 |  | |  |  |  |  |  | 3.9 |  |  |
| Arcachon lagoon | France |  |  | Jun 2007 |  | |  |  |  |  |  | 9.4 |  |  |
| Arcachon lagoon | France |  |  | Oct 2007 |  | |  |  |  |  |  | 8.2 |  |  |
| Arcachon lagoon | France |  |  | Jan 2008 |  | |  |  |  |  |  | 0.023 |  |  |
| Nehalem | USA | 45.5 | -124.0 | 2010-2018 |  | |  |  | 220 |  |  |  | Mud | (Peck et al., 2020) |
| Netarts |  | 45.5 | -124.0 |  |  | |  |  | 150 | 51 |  |  | Mud |  |
| Alsea |  | 44.5 | -124.0 |  |  | |  |  | 200 |  |  |  | Mud |  |
| Coquille |  | 43.2 | -124.5 |  |  | |  |  | 100 |  |  |  | Mud |  |
| Pala‘au | USA | 21.10 | -157.08 | Feb 2016 |  | |  |  | 60.2 | 40.0 |  | 288.0 | Mud | (Soper et al., 2019) |
| Tokyo Bay | Japan | 35.44 | 139.78 | Feb 2011 | 9.3 | |  |  |  |  | -6388.8 |  | Sand | (Tokoro and Kuwae, 2022) |
| Ganghwa-do | Korea | 37.60 | 126.47 | May-Nov, 2017-2019 | 11.9 | |  |  | 24.9 | 49 | 1.0 | 0.6 | Mud | (Dang et al., 2021) |
| Cheonsu Bay | Korea | 36.60 | 126.42 | Oct 2016 | 18.8-24.9 | |  |  |  |  |  | 1.8 | Unknown | (Kang et al., 2018) |
| Western Coast | South Korea | 35.90 | 127.80 | 2013 |  | |  |  | 0.45 | 45.0 |  |  | Unknown | (Sondak and Chung, 2015) |
| Southern Coast | South Korea | 35.90 | 127.80 |  |  | |  |  | 0.45 | 45.0 |  |  | Unknown |  |
| Suncheon Bay | South Korea | 34.80 | 127.60 | review |  | |  |  | 286 |  |  |  | Mud | (Byun et al., 2019) |
| Ganghaw-gun | South Korea | 37.75 | 126.50 |  |  | |  |  | 182 |  |  |  | Mud |  |
| Garolim Bay | South Korea | 36.70 | 126.40 |  |  | |  |  | 139 |  |  |  | Mud |  |
| Ganghwa | South Korea | 37.4 | 126.3 | 2018-2019 |  | |  |  | 71.1 | 54 |  |  | Mud | (Lee et al., 2021) |
| Youngjong | South Korea | 37.3 | 126.3 |  |  | |  |  | 83 |  |  |  | Mud |  |
| Siheung | South Korea | 37.2 | 126.5 |  |  | |  |  | 89.3 |  |  |  | Mud |  |
| Daebu | South Korea | 37.2 | 126.3 |  |  | |  |  | 67.8 |  |  |  | Mixed |  |
| Hwaseong | South Korea | 37.1 | 126.4 |  |  | |  |  | 67.3 |  |  |  | Mixed |  |
| Garolim Bay | South Korea | 36.6 | 126.2 |  |  | |  |  | 34.7 | 16 |  |  | Mixed |  |
| Geunheung | South Korea | 36.4 | 126.1 |  |  | |  |  | 22.9 |  |  |  | Mixed |  |
| Ocheon | South Korea | 36.3 | 126.3 |  |  | |  |  | 40.3 |  |  |  | Mixed |  |
| Biin | South Korea | 36.1 | 126.3 |  |  | |  |  | 54.2 |  |  |  | Mixed |  |
| Seonyudo | South Korea | 35.5 | 126.2 |  |  | |  |  | 14.5 |  |  |  | Mixed |  |
| Gomso Bay | South Korea | 35.3 | 126.4 |  |  | |  |  | 33 |  |  |  | Mixed |  |
| Hampyeong | South Korea | 35.1 | 126.2 |  |  | |  |  | 13.4 |  |  |  | Mixed |  |
| Sinan | South Korea | 34.7 | 126.1 |  |  | |  |  | 37.7 | 16 |  |  | Mud |  |
| Aphaedo | South Korea | 34.5 | 126.2 |  |  | |  |  | 32 |  |  |  | Mixed |  |
| Gangjin Bay | South Korea | 34.3 | 126.5 |  |  | |  |  | 46.5 |  |  |  | Mixed |  |
| Deukryang Bay | South Korea | 34.4 | 126.9 |  |  | |  |  | 19.3 |  |  |  | Mixed |  |
| Suncheon Bay | South Korea | 34.5 | 127.3 |  |  | |  |  | 72.4 | 30 |  |  | Mud |  |
| Yeoza Bay | South Korea | 34.4 | 127.3 |  |  | |  |  | 54.2 |  |  |  | Mud |  |
| Jinhae Bay | South Korea | 35.1 | 128.3 |  |  | |  |  | 83.5 |  |  |  | Mixed |  |
| Nakdong River estuary | South Korea | 35.0 | 128.5 |  |  | |  |  | 18.8 | 7 |  |  | Sand |  |
| Uljin | South Korea | 36.5 | 129.3 |  |  | |  |  | 16.8 |  |  |  | Sand |  |
| Liaohe Delta | China | 40.70 | 122.00 | 2011 |  | |  |  | 100.2 |  |  |  | Unknown | (Zhao et al., 2017) |
| Dongjiang Harbor | China | 39.02 | 117.82 | Oct 2014 |  | | 8.9 | 9.9 | 177.5 |  |  |  | Sand | (Mao et al., 2018) |
| Dashen town | China | 39.21 | 117.96 |  |  | |  |  | 209.3 |  |  |  | Sand |  |
| Exo-city Tianjin | China | 39.10 | 117.77 |  |  | |  |  | 192.7 |  |  |  | Sand |  |
| Yellow River delta | China | 37.81 | 119.04 | Aug, 2009 | 27 | |  | 8.3 |  |  | 279.1 | 1.9 | Unknown | (Wang et al., 2011) |
| Yellow River Delta | China | 37.72 | 119.23 | March2011-2013 |  | |  | 6.6 |  |  | 251.5 | 3.6 | Mud | (Li et al., 2022) |
| Yellow River delta | China | 37.71 | 119.25 | 2011-2013 |  | |  | 3.14 |  |  | 760.8 | 1.7 | Mud | (Chen et al., 2018) |
| Laizhou Bay | China | 37.10 | 119.37 | June, Nov 2012 |  | |  |  | 17.3 | <10 |  |  | Mud | (Wang et al., 2017) |
| Yancheng | China | 36.47 | 120.60 | Aug 2007 |  | |  |  |  | 21.9 |  |  | Sand | (Gao et al., 2012) |
| Jiaozhou Bay (NEE) | China | 36.17 | 120.13 | Dec 2013-Oct 2014 |  | |  |  |  |  | 1134.7 |  | Mud | (Xi et al., 2019) |
| Yancheng | China | 33.62 | 120.62 | 2012-2013 |  | | 2-8 | 0.69 |  |  | 1195.2 | 3 | Mud | (Xu et al., 2014) |
| Yancheng | China | 33.61 | 120.53 | Aug 2012-Apr 2014 |  | |  |  |  |  | 1453.5 | -0.17 | Mud | (Cao et al., 2020) |
| Yancheng | China | 33.58 | 120.53 | 2013-2014 |  | |  |  |  |  | 1370.4 | -0.096 | Unknown | (Xu et al., 2016) |
| Yancheng | China | 33.53 | 120.55 | Sep 2017 |  | |  |  | 30.1 |  |  |  | Mud | (Qi et al., 2019) |
| Yancheng | China | 33.37 | 120.70 | Nov 2011 | 18.5 | | 10.0 | 1.9 | 18.2 | 22.0 |  | 1.2 | Unknown | (Yuan et al., 2015) |
| Yancheng | China | 33.01 | 120.85 | April 2014 |  | |  | 5.6 | 99.4 |  |  |  | Unknown | (Li et al., 2018) |
| Yancheng | China | 33.00 | 120.00 | 2005 |  | |  | 1.6 | 21.0 |  | 252.3 | 3.0 | Mud | (Zhou et al., 2015) |
| Rudong County | China | 32.60 | 121.02 | 2012 |  | |  | 1.10 | 34.0 |  |  |  | Mixed | (Xu et al., 2017) |
| Qidong-high tidal flat | China | 31.79 | 121.90 | Apr 2017 |  | |  | 21.9 |  |  | 0.28 |  | Sand | (Wang et al., 2018) |
| Qidong-middle tidal fla | China | 31.79 | 121.90 |  |  | |  | 17.9 |  |  | 0.98 |  | Sand |  |
| Qidong-low tidal flat | China | 31.79 | 121.90 |  |  | |  | 15.6 |  |  | 1.09 |  | Sand |  |
| Yangtze Estuary | China | 31.71 | 121.09 | June 2016 | 25 | | 0.2-17 | 8.3 |  |  |  | 0.054 | Mud | (Li et al., 2019) |
| Chongming Dongtan | China | 31.42 | 121.83 | May 2004-April 2005 | 19.6 | | 5.5 | 1.9 |  |  |  | 0.96 | Mud | (Wang et al., 2009) |
| Northern transect, Chongming Dongtan | China | 31.63 | 121.97 | 2013 |  | |  |  | 5.4 | 41.1 |  |  | Mud | (Zhang et al., 2017) |
| Middle transect, Chongming Dongtan | China | 31.50 | 122.01 | 2013 |  | |  |  | 5.3 | 34.2 |  |  | Mud |  |
| Southern transect, Chongming Dongtan | China | 31.42 | 121.83 | 2013 |  | |  |  | 4.9 | 38.9 |  |  | Mud |  |
| Nanhui | China | 31.89 | 121.98 | Jan 2019 |  | | 15 |  | 1.2 |  |  | 2.88 | Mud | (Liu, 2020) |
| Nanhui | China | 30.88 | 121.93 | 2017 | 19.4 | | 1.08 (mS /cm) | 1.75 |  |  |  | -19.2 | Mud | (Yang et al., 2021) |
| Sheyang | China | 30.50 | 120.63 | Apr 2011 | 24.1 | |  | 4.2 | 49.6 |  |  | 13.2 | Mud | (Xiang et al., 2015) |
| Hangzhou Bay | China | 30.35 | 121.13 | 2010 | 15.9 | |  | 10.7 |  |  | 2672.5 |  | Mud | (Shao et al., 2016) |
| Minjiang River Estuary | China | 26.045 | 119.61 | Aug 2014 |  | |  |  |  |  | 108720 | 3120 | Mud | (Yang et al., 2017) |
| Minjiang River Estuary | China | 26.02 | 119.64 | Feb-Dec 2019 |  | |  |  |  |  | 1506.3 | 99.7 | Mud | (Cheng et al., 2021) |
|  |  |  |  |  |  | |  |  |  |  | 1015.3 | 26.3 | Sand |  |
| Luoyuan Bay | China | 26.36 | 119.66 | April 2012 |  | |  | 6.3 |  | 73.2 |  |  | Mud | (Ye et al., 2014) |
| Jiulong River Estuary | China | 24.46 | 117.91 | 2011-2012 |  | |  |  |  |  | 390.7 | 37.4 | Mud | (Wang et al., 2016) |
| Fujian | China | 24.40 | 117.92 | Aug 2014 |  | | 14.1 | 9.1 | 66 |  |  |  | Mud | (Feng et al., 2017) |
| Kaomei Wetland | China | 24.32 | 120.53 | Unknown |  | |  |  | 27.4 |  | 463.6 | 9.4 | Mud | (Hsieh et al., 2021) |
| Hanjiang River Estuary | China | 23.45 | 116.43 | Nov 2016 |  | |  | 0.56 | 6.9 |  |  |  | Sand | (Wu et al., 2020) |
| Hanjiang River Estuary | China | 23.45 | 116.43 |  |  | |  | 5.47 | 47.3 |  |  |  | Mud |  |
| Guangzhou | China | 22.95 | 113.58 | 2020-2021 | 24.5 | |  |  |  |  | 1161.6 | 1.77 | Sand | (Zhang et al., 2022) |
| Kaohsiung | China | 22.72 | 120.25 | 2017-2018 |  | |  | 7.7 | 72.3 |  | 1739.7 | 857.5 | Mud | (Huang et al., 2019) |
| Shenzhen Bay | China | 22.50 | 113.97 | 2006-2012 |  | |  |  | 38.0 |  |  |  | Mud | (Lunstrum and Chen, 2014) |
| Mai Po | China | 22.49 | 114.04 | May to July 2020 |  | |  |  | 97.4 | 75.0 |  |  | Mud | (Chen and Lee, 2022a) |
| Ting Kok |  | 22.47 | 114.20 |  |  | |  |  | 125.1 |  |  |  | Sand |  |
| Shenzhen\_FT | China | 22.53 | 114.02 | July-Aug 2008 |  | | 13 | 58.4 |  |  | 9.7 | 369.6 | Mud | (Chen et al., 2010) |
| Shenzhen\_MP | China | 22.48 | 114.03 |  |  | | 12 | 51.1 |  |  | 5.9 | 196.5 | Mud |  |
| Shenzhen\_SKT | China | 22.45 | 113.95 |  |  | | 15 | 21.4 |  |  | 7.2 | 234.0 | Mud |  |
| Shenzhen\_YSO | China | 22.43 | 114.25 |  |  | | 25 | 9.4 |  |  | 4.0 | 231.1 | Mud |  |
| Mai Po | China | 22.5 | 114.02 | 2009-2010 |  | |  | 48.7 |  |  | 2560 |  | Mud | (Chen et al., 2012) |
| Zhuhai | China | 22.43 | 113.63 | Aug 2011 | 29.1 | |  | 11.7 | 0.96 |  |  |  | Mud | (Feng et al., 2019b) |
| Beihai | China | 21.92 | 108.33 | 2017 |  | |  |  | 27.8 |  |  |  | Sand | (Su et al., 2020) |
| Pearl Bay | China | 21.55 | 108.21 | 2017 |  | |  |  | 91.8 |  |  |  | Sand | (Su et al., 2020) |
| Yingluo Bay | China | 21.53 | 109.67 | Dec 2015 |  | |  | 13.6 | 111.2 |  |  |  | Sand | (Yu et al., 2021) |
| Yingluo Bay | China | 21.33 | 110.42 | Apr 2012 |  | | 4.0 | 7.7 | 97.3 |  |  |  | Mud | (Wang et al., 2013) |
| Leizhou Peninsula | China | 20.93 | 110.15 | Mar 2015 |  | | 13.8 | 6.6 | 60 |  |  |  | Mud | (Feng et al., 2019a) |
| Beihai | China | 21.5 | 109.68 | 2021 | 26 | |  | 1.3 |  |  | 0 | -0.00256 | Sand | (Zheng et al., 2023) |
| Leizhou Peninsula\_TM | China | 21.00 | 110.17 | July 2009 |  | |  | 7.3 | 51.8 | 205 |  |  | Mud | (Yang et al., 2014) |
| Leizhou Peninsula\_GQ |  | 21.60 | 109.75 | July 2009 |  | |  | 11.5 | 123.1 | 95 |  |  | Mud |  |
| Leizhou Peninsula\_FC |  | 20.90 | 110.20 | July 2009 |  | |  | 0.1 | 1.4 | 37 |  |  | Mud |  |
| Leizhou Peninsula\_TC |  | 21.17 | 110.47 | July 2009 |  | |  | 2.4 | 33.6 | 85 |  |  | Mud |  |
| Liaohe River Delta | China | 40.60 | 122.10 | Winter 2014, Summer 2015 |  | |  |  | 69.9 | 98 |  |  | Mud | (Chen et al., 2020) |
| Tianjin Hangu |  | 39.20 | 117.9 |  |  | |  |  | 84.8 | 228 |  |  | Mud |  |
| Yellow River Delta |  | 37.5 | 118.9 |  |  | |  |  | 22.4 |  |  |  | Mud |  |
| Jiaozhou Bay |  | 36.2 | 120.2 |  |  | |  |  | 82 | 166 |  |  | Mud |  |
| Yancheng |  | 33.3 | 120.7 |  |  | |  |  | 59.4 |  |  |  | Mud |  |
| Chongming Dongtan |  | 31.4 | 121.9 |  |  | |  |  | 73.3 | 136 |  |  | Mud |  |
| Cixi |  | 30.2 | 121.5 |  |  | |  |  | 67.9 | 214 |  |  | Mud |  |
| Minjiang River |  | 26.0 | 119.6 |  |  | |  |  | 24.6 |  |  |  | Mixed |  |
| Jiulong River |  | 24.4 | 117.9 |  |  | |  |  | 124.9 | 138 |  |  | Mud |  |
| Pearl River |  | 22.4 | 113.6 |  |  | |  |  | 75.1 | 126 |  |  | Mixed |  |
| Dongzhai Port |  | 19.9 | 110.6 |  |  | |  |  | 207 | 361 |  |  | Mixed |  |
| Yingluo Bay |  | 21.4 | 109.7 |  |  | |  |  | 125.7 |  |  |  | Mixed |  |
| Liao River Estuary | China | 40.61 | 122.13 | 2014-2015 |  | |  |  | 76.6 |  |  |  | Mud | (Zhang et al., 2020) |
| Qinhuangdao Shoal |  | 39.85 | 119.52 |  |  | |  |  | 10 |  |  |  | Sand |  |
| Jian River Estuary |  | 39.21 | 117.96 |  |  | |  |  | 81.7 |  |  |  | Mud |  |
| Yellow River Estuary |  | 37.37 | 118.96 |  |  | |  |  | 29.2 |  |  |  | Mixed |  |
| Sishiliwan Shoal |  | 37.38 | 121.45 |  |  | |  |  | 4 |  |  |  | Sand |  |
| Dagu River Estuary |  | 36.20 | 120.19 |  |  | |  |  | 57.5 |  |  |  | Mud |  |
| Subei Shoal |  | 33.27 | 120.79 |  |  | |  |  | 10.1 |  |  |  | Mixed |  |
| Yangtze River Estuary |  | 31.47 | 121.97 |  |  | |  |  | 60.2 |  |  |  | Mixed |  |
| Qiantang River Estuary |  | 30.29 | 121.46 |  |  | |  |  | 59.8 |  |  |  | Mud |  |
| Minjiang River Estuary |  | 26.04 | 119.64 |  |  | |  |  | 49.4 |  |  |  | Mixed |  |
| Jiulong River Estuary |  | 24.41 | 117.95 |  |  | |  |  | 146.1 |  |  |  | Mud |  |
| Pearl River Estuary |  | 22.43 | 113.66 |  |  | |  |  | 56.4 |  |  |  | Sand |  |
| Yingluo Bay |  | 21.47 | 109.76 |  |  | |  |  | 15.3 |  |  |  | Sand |  |
| Dongzhai Bay |  | 20.00 | 110.60 |  |  | |  |  | 26.9 |  |  |  | Sand |  |
| Hackensack River Estuary | New Jersey Meadowlands | 40.82 | -74.05 | 2012 |  | | 2-8 | 5.04 |  |  |  | 14.03 | Mud | (Reid et al., 2013) |
| Hammersmith Creek | Georgia | 31.34 | -81.48 | 2008-2009 |  | |  |  |  |  |  | 337.5 | Mud | (Segarra et al., 2013) |
| Esrero Punta Banda | Mexico | 31.73 | -116.63 | 2008 |  | |  |  | 230.3 | 77 |  |  | Mud | (Watson and Corona, 2018) |
| Bahia San Quintin |  | 30.40 | -115.98 |  |  | |  |  | 292.0 | 73 |  |  | Mud |  |
| Laguna Ojo de Liebre |  | 27.48 | -113.95 |  |  | |  |  | 279.3 | 60 |  |  | Sand |  |
| Laguna San Ignacio |  | 26.60 | -112.85 |  |  | |  |  | 48.9 | 33 |  |  | Mixed |  |
| Bahia Magalena |  | 24.65 | -111.98 |  |  | |  |  | 66.7 | 27 |  |  | Sand |  |
| Red Sea | Eygpt | 27.2 | 33.4 | unknown |  | |  | 4.2 | 65.0 | 2.0 |  |  | Mud | (Eid and Shaltout, 2016) |
| Arabian Gulf | United Arab Emirates | 24.2 | 53.6 | Jan 2013, Nov 2014 |  | |  |  | 192.5 |  |  |  | Unknown | (Schile et al., 2017) |
| Red Sea | Saudi Arabia | 22.33 | 39.1 | Jan, 2021 |  | |  |  |  |  | 150.05 | 0.29 | Mud | (Saderne et al., 2023) |
| Xuan Thuy 1 | Viet Nam | 20.23 | 106.53 | Apr 2016 |  | |  | 7.6 | 88.6 |  |  |  | Sand | (Hien et al., 2018) |
| Xuan Thuy 2 |  | 20.23 | 106.53 |  |  | |  | 8.0 | 87.7 |  |  |  | Sand |  |
| Xuan Thuy 3 |  | 20.23 | 106.53 |  |  | |  | 7.5 | 86.5 |  |  |  | Sand |  |
| Len River | Viet Nam | 19.88 | 106.00 | Nov 2014 |  | |  | 9.2 | 91.4 |  |  |  | Mud | (Pham et al., 2017) |
| Mekong Delta | Viet Nam | 10.51 | 106.91 | Oct 2013 |  | |  | 18.4 | 144.0 |  |  |  | Mud | (Dung et al., 2016) |
| Lothian Island | India | 21.64 | 88.35 |  | 22.1 | | 18.6 | 6 |  |  | 3136.3 |  | Mud | (Das et al., 2017) |
| Seletar island | Singapore | 1.44 | 103.86 | Feb-Mar 2017 |  | |  |  | 35.7 |  | 960.4 |  | Unknown | (Saavedra-Hortua et al., 2020) |
| Sungei Buloh |  | 1.45 | 103.72 |  |  | |  |  | 410.7 |  | 2450.4 |  | Unknown |  |
| Chek Jawa | Singapore | 1.41 | 103.99 | 2013-2014 |  | |  | 14 | 143 |  |  |  | Mixed | (Phang et al., 2015) |
| Chek Jawa |  | 1.41 | 103.99 | 2010-2011 |  | |  | 6 | 124 |  |  |  | Sand |  |
| Amazon | Brazil | -0.75 | -47.27 | May, Sep 2017 |  | |  |  | 77.9 | 143.2 |  |  | Mixed | (Matos et al., 2020) |
| Amazon |  | -0.75 | -47.27 |  |  | |  |  | 173.9 | 218.7 |  |  | Mud |  |
| Amazon |  | -0.75 | -47.27 |  |  | |  |  | 129.3 | 215.8 |  |  | Mud |  |
| Bintuni Bay | Indonesia | -2.57 | 133.47 | Jan 2016 |  | |  | 14.4 | 124 |  |  |  | Mud | (Sasmito et al., 2020) |
| Semarang | Indonesia | -6.93 | 110.47 | Unknown |  | |  |  | 112.7 |  |  |  | Mud | (Mutiatari et al., 2018) |
| Tamandare | Brazil | -8.67 | -35.10 | 2005 |  | |  |  | 514.2 | 1129 |  |  | Mud | (Sanders et al., 2010c) |
| Piraque-Acu-Mirim Estuary | Brazil | -19.94 | -40.17 | 2014 |  | |  |  |  | 555 |  |  | Unknown | (Bernardino et al., 2020) |
| Piraque-Acu-Mirim Estuary | Brazil | -19.94 | -40.17 |  |  | |  |  |  | 62 |  |  | Unknown |  |
| Vitoria Bay | Brazil | -20.25 | -40.33 |  |  | |  |  |  | 53 |  |  | Unknown |  |
| Karumba | Australia | -17.42 | 140.86 | Aug 2016, 2018 |  | |  |  |  | 31.7 | 3652 |  | Mud | (Brown et al., 2021) |
| Gladstone 1 | Australia | -23.76 | 151.28 |  |  | |  |  |  | 11.3 |  |  | Mud |  |
| Gladstone 2 | Australia | -23.76 | 151.28 | July 2009, 2010, Feb 2015 |  | |  |  |  | 25.2 |  |  | Mud |  |
| Guaratiba | Brazil | -23.00 | -43.61 |  |  | |  |  |  | 17.8 | 1335.4 |  | Mud |  |
| Paraty | Brazil | -23.25 | -44.70 | 2005 |  | |  | 98.7 |  | 270 |  |  | Mud | (Sanders et al., 2010a) |
| Cananeia | Brazil | -25.10 | -47.99 | 2005 |  | |  | 25.6 |  | 234 |  |  | Mixed | (Sanders et al., 2010b) |
| North Island | New Zealand | -36.61 | 174.53 | Nov 2013-Jan 2014 | 20.7 | |  | 8.9 |  |  | -874.4 |  | Mixed | (Bulmer et al., 2015) |
| Tairua Upper | New Zealand | -37.03 | 175.83 | May-June 2016 |  | |  |  | 25.62 |  |  |  | Sand | (Bulmer et al., 2020) |
| Paunui | New Zealand | -37.03 | 175.85 |  |  | |  |  | 30.66 |  |  |  | Sand |  |
| Tairua Mid | New Zealand | -37.02 | 175.84 |  |  | |  |  | 31.37 |  |  |  | Sand |  |
| Tairua Entrance | New Zealand | -37 | 175.86 |  |  | |  |  | 20.14 |  |  |  | Sand |  |
| Onerahi | New Zealand | -35.77 | 174.37 | November/ December 2017; June/ July 2018 | 20.8/22 | |  | 8.07 |  |  | 21.28 | 0.015 | Sand | (Hamilton et al., 2020) |
| Parua Bay |  | -35.78 | 174.44 |  | 19.6/21.1 | |  | 11.31 |  |  | -9.46 | 0.048 | Sand |  |
| Takahiwai |  | -35.81 | 174.43 |  | 20.7/17.5 | |  | 6.96 |  |  | -4.73 | 0.008 | Sand |  |
| Raglan |  | -37.13 | 174.87 |  | 20.8/23.2 | |  | 19.14 |  |  | 2.36 | -0.013 | Sand |  |
| Whangateau |  | -36.38 | 174.78 |  | 13.2/22.0 | |  | 7.25 |  |  | 23.64 | 0.032 | Sand |  |

Table 2. Comparison C sequestration and emission data of tidal flats estimated in this study with other published data on vegetated coastal wetlands.

| Ecosystems | Global area (km2) | Number of study sites | C stocks (0-1m) (Mg C ha-1) | CAR  (g C m-2 yr-1) | Global C stocks (0-1m) (Pg) | Global CAR  (Tg C yr-1) | CO2 emission flux  (mg CO2 m-2 d-1) | CH4 emission flux (mg CH4 m-2 d-1) | References |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Tidal flats | 127921 |  |  |  |  |  |  |  | (Murray et al., 2019) |
|  | NA |  | Mean: 86.3±7.6  Median: 67.9 | 129.8±29.9  53 | 1.1±0.1  0.9 | 16.6±3.8  6.8 |  |  | (Chen and Lee, 2022b) |
|  | 127921 |  | Mean: 90.5±7.2  Median: 69.9 | 106.2±21.8  51 | 1.16±0.09  0.89 | 13.6±2.8  6.5 | 319.7±259.0 96.1 | 68.1±25.9  1.9 | This study |
| Mangroves | 137760 |  | Mean: NA | 227.2±30.7 |  | 31.3±4.2 |  | 5.4±1.7 | (Giri et al., 2011; Rosentreter et al., 2018b) |
|  | 137760 |  | Mean: NA | 163.3 |  | 22.5 |  |  | (Breithaupt et al., 2012; Giri et al., 2011) |
|  | 138000 |  | Mean: NA | 233.0 |  | 22.9 ± 6.6 |  |  | (Giri et al., 2011; Jennerjahn, 2020) |
|  | 81485 |  | Mean: 293.9 ± 208.3\*  Median: 237.4 |  | 2.4  1.9 |  |  |  | (Hamilton and Casey, 2016; Ouyang and Lee, 2020) |
|  | 86495 |  | Mean: 565.4 ± 25.7  Median: 500.5 | 179.6  103.0 | 6.2±0.2  5.9 | 15.0  8.6 |  |  | (Alongi, 2020b; Hamilton and Casey, 2016) |
|  | NA |  |  |  | Mean: 2.96±0.5 |  |  |  | (Hamilton and Friess, 2018) |
|  | 81437 |  | Mean: 283 ± 193\*  Median: NA |  | Mean: 2.6 |  |  |  | (Atwood et al., 2017) |
|  | NA |  |  |  |  |  | Mean: 2486±391.6 |  | (Rosentreter et al., 2018a) |
|  | 135812 |  |  |  |  |  | Median: -7250.1 | Median: 1.6 | (Rosentreter et al., 2023) |
|  |  |  |  | 194±15  NA |  | 41 |  |  | (Wang et al., 2021) |
| Salt marshes | 41657 |  |  | 244.7±26.1  NA |  | 10.2±1.1  NA |  |  | (Ouyang and Lee, 2014) |
|  | 41657 |  | Mean: 317.2±19.1  Median: 282.2 |  | 1.3±0.1  1.2 |  |  |  | (Alongi, 2018) |
|  | 54951 |  | Mean: 317.2±19.1  Median: 282.2 |  | 1.7±0.1  1.6 |  |  |  | (Alongi, 2020a; McOwen et al., 2017) |
|  | 54550 |  |  |  |  |  | Median: -2130.0 | Median: 10.5 | (Rosentreter et al., 2023) |
|  |  |  |  | 168±7 |  | 12.63 |  |  | (Wang et al., 2021) |
| Seagrasses | 160387 |  | Mean: 194.2±20.2\*\*  Median: 139.7 | 138±38  NA | 3.1±0.3\*\*  2.2 | 22.1±6.1  NA |  |  | (McKenzie et al., 2020) (McLeod et al., 2011) (Fourqurean et al., 2012) |
|  | 322620 |  |  |  |  |  | Median: -1629.8 | Median: 1.5 | (Rosentreter et al., 2023) |

NA, not available; \*, mean ± standard deviation; \*\*, mean ± 95% confidence interval