ELECTRONIC SUPPLEMENTARY MATERIAL

Climate change mitigation potential of wetlands and the cost-effectiveness of their restoration

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**Contents**

|  |  |
| --- | --- |
| **Supplementary Method** | Page 2-5 |
| **Supplementary Table 1**  Summary of the references used for this meta-analysis, regarding the carbon budget and radiative effect of wetlands. | Page 6-10 |
|  |  |
| **Supplementary Table 2** Summary of the references used for this meta-analysis, regarding the cost-effectiveness of wetlands restoration. | Page 11 |
| **Supplementary Figure 1** Boxplots for mangrove and inland wetlands presenting (a) net ecosystem exchange (NEE); (b) aquatic exchange over NEE; (c) CH4 fluxes; (d) CO2:CH4 ratio (that sums all the CO2 and CH4 inputs and outputs) | Page 12 |
| **Supplementary References** | Page 13-17 |

**Methods**

We performed two systematic reviews, which were analysed through a meta-analysis; the first to determine wetland radiative effect and the second to determine wetland restoration costs. Both systematic reviews exclusively collected data published up until 31 March 2020, using the Scopus database by Elsevier.

We only used data reported in the peer-reviewed literature because this was the most robust way to control and standardise our search. Searches using grey literature (webpages, reports, conference proceedings, etc.) were not conducted because of uncertainties in quality, accessibility and achievability ([1](#_ENREF_1)). However, we acknowledge that this strict search criteria may omit some literature on restoration costs conducted by non-governmental organizations.

***1 Wetlands carbon budget and radiative effects***

*1.1 Literature search*

We conducted a systematic review of studies that quantified wetlands net carbon budget, including CH4 fluxes over an annual time scale (or growing season for >50° latitude studies). We first developed and tested a search string based on trial and error using a set known of relevant studies from three previously published literature reviews ([2-4](#_ENREF_2)). The search string was considered satisfactory when all the pre-selected studies appeared in our results. The search string used was: ["greenhouse gas" OR carbon OR methane OR CO2 OR CH4) AND (uptake OR flux OR emission OR sink OR source OR budget or sequestration OR storage OR balance OR exchange) AND (peatland OR tundra OR marsh OR mangrove OR floodplain OR fen OR bog)].

*1.2 Critical appraisal and data extraction*

The selected papers went through several rounds of quality control, conducted by two of the authors independently. First, titles (round 1) and abstracts (round 2) were screened. A keyword search approach was used. If none of the terms “carbon”, “CO2”, “methane”, “budget”, and an ecosystem name appeared, the publication was excluded. Selected papers were then downloaded and critically appraised using five questions to ensure consistency and relevance in our selection: Is the study site a natural, restored, or rewetted wetland ecosystem? Was CH4 measured? Was the study conducted over a complete annual timeframe or over the growing season for high latitude (>50°)? Was vegetation primary productivity considered in the budget? Were measurements taken directly in the field and not subject to any treatment that might affect the natural response of the system? Only papers in which the six answers were “yes” were considered for extraction. We highlight that studies on disturbed wetlands were not considered. Only studies from undisturbed and restored or rewetted peatlands were considered, in line with our stated research objectives.

For inclusion in this review, studies had to provide the wetland type description; GPS coordinates; study length duration; measurement technique and equipment used; time period since restoration or rewetted except for undisturbed sites; net ecosystem exchange (NEE) or net ecosystem productivity (NEP), terrestrial CH4 exchange, gross primary productivity (GPP), ecosystem respiration (Re), total organic carbon from rain (Rain TOC), aquatic carbon export including particulate organic carbon (POC), dissolved organic carbon (DOC), dissolved inorganic carbon (DIC), dissolved CO2 and CH4, aquatic CO2 evasion, terrestrial CH4 exchange, and aquatic CH4 evasion, when available. All these components are required to produce the net ecosystem carbon budget (NECB) as presented in ([5](#_ENREF_5)) and summarized in Figure 1. Because of the extensive work it represents to measure all the components required in this approach, almost no study has done so. Therefore, we adapted our selection as a compromise as such that NEE (or -NEP) and terrestrial CH4 exchange were the two mandatory variables required to include the study in our meta-analysis. Although not ideal, these two variables were enough to complete our research objective to estimate both NECB and ecosystem net radiative forcing (using SGWP and switchover time).

To clarify common confusion between terms, GPP represents the gross assimilation of CO2 via photosynthesis and NEE represents the net terrestrial carbon flux (Re-GPP). When negative, NEP would indicate a net uptake or storage of CO2 from the ecosystem. The only difference between NEE (=Re-GPP) and NEP (=GPP-Re) is the sign ([5](#_ENREF_5)). All NEP values were converted to NEE to ensure consistency between studies. Similarly, negative NECB indicates a net carbon sink and positive NECB a net carbon source towards the atmosphere (Fig. 1).

Studies were generally excluded during critical appraisal and data extraction if their metrics were incomplete or unclear, or if they extrapolated secondary data to their study sites from previously published sources. Studies where the conversion rate between years and sites was unclear were also removed. If individual annual carbon budgets were provided for an ecosystem over multiple years, all years were extracted first and averaged to only one annual carbon budget for our meta-analysis. As some research project have presented CO2 and CH4 results from the same site and period in independent papers, we checked for all the papers that only presented CH4 data to see if a companion paper existed. This was done by checking in the text if any reference were made to a related CO2 publication or if a following study was published and cited the initial paper.

*1.3 Calculations*

Data were extracted or converted in gram of carbon (gC.m-2.y-1) for consistency. Data units were then standardized to g.CO2.m-2.y-1, g.CH4.m-2.y-1,and in g.CO2.eq.m-2.y-1 at the 100 year time scale using the sustained global warming potential (SGWP) ratio of 45 between CH4 to CO2 ([6](#_ENREF_6)). Values standardized in kg.CO2 and kg.CH4 were used along with equations from ([6](#_ENREF_6)) to determine the ecosystem switchover time which indicates at what age does the ecosystem have a net negative radiative forcing.

***2 Wetland restoration costs***

*2.1 Literature search*

We conducted a systematic review of studies that reported wetland restoration costs. We used the search string, "cost\*" AND "restor\*” OR “rehab\*” AND "ecosystem\*", to capture all studies on rehabilitation and restoration. The broad term “ecosystem” was chosen for the same reasons as explained in Section 2.1.1; however, searches were repeated for "wetland\*” and the individual wetland types and terminology variants to ensure all relevant peer-reviewed studies were captured.

*2.2 Critical appraisal and data extraction*

The titles and abstracts of collected articles were screened to remove studies that did not focus on wetland ecosystems (undefined ‘wetlands’ were also excluded). We then searched within individual studies and only included those that reported (1) restoration costs, (2) the size of the restored area, and (3) the duration of the restoration event[[1]](#footnote-1), for a specific restoration project or projects. Studies that reported actual costs from completed restoration projects, and those that estimated costs for planned restoration projects, were both included. If a study gave data on multiple restoration projects, data were extracted for each individual project. Care was taken not to double count individual sites that may have featured in multiple different articles.

*2.3 Calculations*

Calculations followed the methodology of ([7](#_ENREF_7)) and are summarised here. Total project costs[[2]](#footnote-2) were used, with most studies reporting these in US dollars. Costs reported in local currencies were converted to US dollars using the foreign exchange rates listed in the Penn World Tables ([8](#_ENREF_8)). When stated, the year of data collection was used, and if absent the publication year was used; for example, if a Canadian study published in 2008 collected data in 2004, then the CAD-USD exchange rate on 1 January 2004 was used. Once in US dollar format, costs were adjusted for inflation in each respective country by using the consumer price index (CPI), which resulted in all costs being standardised to US$ 2010 prices ([9](#_ENREF_9)). CPI data was extracted from The World Bank Development Indicators ([9](#_ENREF_9)).

Finally, costs were standardised to US$.ha-1.yr-1 format, based on the timeframes and spatial scale of restoration reported. Where discount rates were applied to cost data, the discount rate of zero was selected for inclusion, because this would be the case for all other data in which discount rates had not been applied (i.e. current prices). When multiple timeframes were modelled (e.g. data subjected to analyses running to both 2020 and 2050), the shortest / most recent timeframe was selected for inclusion, because shorter projections generally have less uncertainty. For each wetland type, the median cost was taken and reported along with the second and third quartiles, outliers, and the range, using boxplots. In a final stage, these cost data were combined with the data on wetlands carbon budgets and radiative effects, to calculate the cost-effectiveness of wetland restoration for climate change mitigation.

Supplementary Table 1: Summary of the references used for this meta-analysis, regarding the carbon budget and radiative effect of wetlands. “SGWP 100y“ stands for Sustained Global Warming Potential at the 100 year horizon, “NECB“ for the net ecosystem carbon budget, “NEP“ for net ecosystem production, “TOC“ for total organic carbon, “EC-GF“ for Eddy Covariance with Gap Filled data, “EC- no GF“ for Eddy Covariance with no Gap Filled data, “MC“ for manual chambers. Values are presented, when available, as mean of the total annual measurements ± standard error.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Wetland type** | **Lat,**  **Long** | **Measurement (study len**  **gth)** | **Switchover time** | **SGWP 100y** | **NECB** | **NEP  (Re-GPP)** | **Aquatic exchange** | **CH4 flux** | **Rain TOC** | **Ref.** |
|  |  |  | **years** | **gCO2eq m-2 y-1** | **gC m-2 y-1** | **gC m-2 y-1** | **gC m-2 y-1** | **gC m-2 y-1** | **gC m-2 y-1** |  |
| Mangrove | Global | Global Review | 0 | -776.5 | -233 | -1145.5 | 856 | 1.5 | NA | ([10](#_ENREF_10)) |
| Saltmarsh | 29.5 N,  90.3 W | EC-GF  (annual) | NA | 1246.6 | 181 | 170.6 | NA | 10.4 | NA | ([11](#_ENREF_11), [12](#_ENREF_12)) |
| Saltmarsh | 31.5N,  122 E | EC-GF  (annual) | 17 | -1284.7 | -620 | -637.6 | NA | 17.6 | NA | ([13](#_ENREF_13)) |
| Freshwater marsh | 25.8 N,  81.1 W | EC-GF  (annual) | 0 | -2912 | -978 | -990 | NA | 12 | NA | ([14](#_ENREF_14)) |
| Freshwater marsh | 29.9 N,  90.3 E | EC-GF (annual) | 317.3 | 1567.7 | -290.2 | -337 | NA | 50.8 | NA | ([11](#_ENREF_11), [12](#_ENREF_12)) |
| Freshwater marsh | 30.5 N,  84.2 W | MC  (Xannual) | 153.6  ±42.9 | 1249.2  ±498.0 | -957.6  ±13.3 | -1042  ±5.3 | NA | 84.8  ±8.0 | NA | ([15](#_ENREF_15)) |
| Freshwater marsh | 31.3 N,  81.4 W | EC-GF (annual) | 925.2 | 5473.4 | -254 | -368 | NA | 114 | NA | ([16](#_ENREF_16)) |
| Freshwater marsh | 37.00 N,  76.5 W | MC  (annual) | 363.4 | 2282.7 | -347.7 | -411.1 | NA | 63.3 | NA | ([15](#_ENREF_15)) |
| Freshwater marsh | 41.5 N,  82.9 W | EC-GF (Xannual) | NA | 3034  ±242.5 | 42.7  ±32.8 | 14.5  ±29.0 | -22.7  ±2.2 | 50.8  ±2.3 | NA | ([17](#_ENREF_17)) |
| Freshwater marsh | 45.4 N,  75.5 W | EC-GF (annual) | 2037.6 | 6779.6 | -97 | -224 | NA | 127 | NA | ([18](#_ENREF_18)) |
| Freshwater marsh | 47.6 N,  133.5 E | EC-GF [CO2]; MC [CH4] (Xannual) | 1142.0  ±207.9 | 2086.1  ±81.1 | -79.2  ±15.6 | -121.5  ±15.2 | NA | 42.3  ±0.42 | NA | ([19](#_ENREF_19)) |
| Tropical Peat Swamp | 1.4 N,  111.4 E | EC-GF (annual) | 25.6 | -249.1 | -131.7 | -136 | NA | 4.2 | NA | ([20](#_ENREF_20), [21](#_ENREF_21)) |
| Tropical Peat Swamp | 2.3 N,  113.9 E | EC-GF (annual) | NA | 646.1 | -174.1 | 174 | NA | 0.1 | NA | ([22](#_ENREF_22), [23](#_ENREF_23)) |
| Floodplain | 16.5 N,  56.4 W | EC-GF (annual) | 255.8 | 549.7 | -141.2 | -161 | 0.8 | 19 | NA | ([24](#_ENREF_24)) |
| Tundra | 63.9 N,  149.2 W | EC-GF (annual) | NA | 118.4 | 13.9 | 12.7 | NA | 1.2 | NA | ([25](#_ENREF_25)) |
| Tundra | 69.6 N,  161.3 E | EC-GF [CO2]; MC [CH4] (Xannual) | NA | 942.7  ±153.3 | 9.65  ±7.6 | -6.5  ±7.8 | NA | 16.2  ±2.6 | NA | ([26](#_ENREF_26)) |
| Tundra | 70.8 N,  147.5 W | EC-GF (annual) | NA | 118.4 | 13.9 | 12.7 | NA | 2.2 | NA | ([27](#_ENREF_27)) |
| Tundra | 71.3 N, 156.6 W | EC-GF (seasonal) | 232 | 44.2 | -13.3 | -14.9 | NA | 1.6 | NA | ([28](#_ENREF_28)) |
| Tundra | 74.4 N, 136.3 E | EC-GF (annual) | 56.8 | -75.5 | -68.9 | -72 | NA | 3.2 | NA | ([29](#_ENREF_29), [30](#_ENREF_30)) |
| Tundra | 74.5 N,  20.6 W | EC-GF [CO2]; MC [CH4] (Xannual) | 4614  ±3079 | 315.8  ±88.5 | -21.9  ±18.2 | -28.9  ±17.8 | NA | 7.1  ±0.4 | NA | ([31](#_ENREF_31)) |
| Tundra | 74.8 N,  147.5 W | EC-GF [CO2]; EC-no GF [CH4] (Xannual) | 16.2  ±5.6 | -192.3  ±21.0 | -86.4  ±2.4 | -88.7  ±2.2 | NA | 2.2  ±0.2 | NA | ([32](#_ENREF_32), [33](#_ENREF_33)) |
| Peatland (bog) | 37.4 S,  175.6 E | EC-GF (Xannual) | 166.9  ±45.5 | 276.4  ±194.0 | -176.3  ±43.3 | -205.1  ±45.4 | 12.4  ±0.5 | 16.4  ±3.7 | NA | ([34](#_ENREF_34)) |
| Peatland (bog) | 43.3 N, 114.8 E | EC-GF (Xannual) | 287.8  ±30.3 | 470.9  ±40.8 | -130.1  ±15.7 | -147  ±16.2 | NA | 16.9  ±0.7 | NA | ([35](#_ENREF_35)) |
| Peatland (bog) | 45.41 N,  75.48 W | EC-GF (annual) | 337.8 | 128.7 | -21.6 | -40.2 | 14.9 | 3.7 | NA | ([36](#_ENREF_36)) |
| Peatland (bog) | 47.5 N, 93.5 W | EC-GF (Xannual) | 1572.3  ±239.6 | 846.2  ±144.5 | -19  ±2.3 | -35.3  ±2.2 | NA | 16.3  ±2.5 | NA | ([37](#_ENREF_37)) |
| Peatland (bog) | 47.6 N,  14.3 E | EC-GF (Xannual) | 280.9  ±126.6 | 90.5  ±60.0 | -49.2  ±20.9 | -54.0  ±21.2 | NA | 4.8  ±0.3 | NA | ([38](#_ENREF_38)) |
| Peatland (bog) | 47.8 N,  11.3 E | EC-GF (annual) | 161 | 89.9 | -56.7 | -62 | NA | 5.3 | NA | ([39](#_ENREF_39)) |
| Peatland (bog) | 48.0 N,  11.3 W | MC (annual) | NA | 1290.1 | 250.7 | 244.1 | NA | 6.6 | NA | ([40](#_ENREF_40)) |
| Peatland (bog) | 48.3 N,  58.7 W | EC-GF (Xannual) | NA | -103.2  ±213.7 | -78.7  ±60.7 | -82  ±60.8 | NA | 3.3  ±0.2 | NA | ([41](#_ENREF_41)) |
| Peatland (bog) | 48.4 N,  11.7 E | EC-GF (seasonal) | 8969 | 217.1 | 1.8 | -1.9 | NA | 3.7 | NA | ([42](#_ENREF_42)) |
| Peatland (bog) | 49.1 N,  123.0 W | EC-GF (annual) | 911 | 612.4 | -29.1 | -103.7 | 62.6 | 12 | NA | ([43](#_ENREF_43)) |
| Peatland (bog) | 51.9 N,  10.0 W | EC-GF (Xannual) | NA | 118.5  ±20.4 | -29.8  ±5.1 | -47.8  ±5.0 | 14.0  ±0.3 | 4.1  ±0.1 | NA | ([44](#_ENREF_44)) |
| Peatland (bog) | 53.7 N,  8.8 E | EC-GF (Xannual) | 4532  ±3137 | 122  ±88.4 | -15.2  ±12.2 | -18.4  ±11.5 | NA | 3.2  ±0.8 | NA | ([45](#_ENREF_45)) |
| Peatland (bog) | 55.8 N,  3.2 W | EC-GF (annual) | NA | 260.5 | 8.2 | -27.8 | 35 | 4.1 | -3.1 | ([46](#_ENREF_46)) |
| Peatland (bog) | 58.4 N,  4.0 W | EC-GF [CO2]; MC [CH4] (annual) | 51.8 | -122.1 | -99.7 | -114 | 10 | 4.3 | NA | ([47](#_ENREF_47)) |
| Peatland (bog) | 62.8 N,  30.9 E | MC (annual) | NA | 498.69 | 90 | 80 | 7 | 3 | NA | ([48](#_ENREF_48)) |
| Peatland (bog) | 63.7N,  20.1 E | MC (Xannual) | >20,000 | 235  ±8.5 | 2.8  ±3.4 | -6.6  ±2.6 | NA | 4  ±0.1 | NA | ([49](#_ENREF_49)) |
| Peatland (fen) | 46.0 N,  11.0 E | EC-GF (annual) | NA | 854.1 | 183.9 | 180.7 | NA | 3.2 | NA | ([50](#_ENREF_50)) |
| Peatland (fen) | 52.1 N, 5.0 E | EC-GF [CO2]; MC [CH4] (annual) | 236 | 893.4 | -262 | -311 | 21.4 | 27.6 | NA | ([51](#_ENREF_51)) |
| Peatland (fen) | 52.3 N,  0.3 E | EC-GF [CO2]; MC [CH4] (annual) | 138.2 | 105.6 | -100.4 | -119 | 4.2 | 8.8 | NA | ([52](#_ENREF_52)) |
| Peatland (fen) | 54.0 N,  113.0 W | MC (Xannual) | 399.5  ±34.1 | 1521.8  ±125.1 | -231.8  ±41.8 | -274.0  ±46.6 | NA | 42.2  ±4.9 | NA | ([15](#_ENREF_15), [53](#_ENREF_53), [54](#_ENREF_54)) |
| Peatland (fen) | 54.1 N,  72.5 W | MC (annual) | NA | 729.2 | 86.2 | 78.9 | NA | 7.4 | NA | ([53](#_ENREF_53), [54](#_ENREF_54)) |
| Peatland (fen) | 55.6 N,  22.8 W | EC-GF (annual) | 174.3  ±32.7 | 332.5  ±10.6 | -191.5  ±76.2 | -210  ±80.6 | NA | 18.5  ±4.9 | NA | ([55](#_ENREF_55)) |
| Peatland (fen) | 58.7 N,  93.8 W | EC-GF (annual) | 5133 | 245 | -1 | -5.4 | NA | 4.4 | NA | ([56](#_ENREF_56)) |
| Peatland (fen) | 61.8 N,  24.2 W | EC-GF (annual) | 424.1 | 370.6 | -43.9 | -53.4 | NA | 9.5 | NA | ([57](#_ENREF_57)) |
| Peatland (fen) | 62.8 N,  31.0 E | EC-GF (Xannual) | 30.3  ±60.9 | -195.2  ±47.2 | -111.9  ±37.3 | -123.6  ±43.9 | 7.8  ±5.0 | 3.8  ±1.6 | NA | ([58](#_ENREF_58)) |
| Peatland (fen) | 64.2 N,  19.6 E | EC-GF [CO2]; MC [CH4] (Xannual) | 1011.1  ±448.8 | 559.8  ±215.5 | -23.6  ±4.6 | -51.5  ±4.9 | 17.8  ±3.7 | 11.5  ±3.5 | -4.8 | ([59](#_ENREF_59)) |
| Peatland (fen) | 68.0 N,  24.2 E | EC-GF [CO2]; MC [CH4] (annual) | NA | 899.9 | 15 | 0 | NA | 15 | NA | ([60](#_ENREF_60)) |
| Peatland (fen) | 68.4 N,  19.0 E | EC-GF (Xannual) | 790  ±60.2 | 947  ±30.9 | -57.3  ±3.9 | -77.9  ±3.9 | NA | 20.6  ±0.5 | NA | ([40](#_ENREF_40), [61](#_ENREF_61), [62](#_ENREF_62)) |
| Peatland (fen) | 68.8 N,  161.5 E | EC-GF (Xannual) | 4255 | 263.8  ±0.7 | -6.95  ±16.6 | -12.1  ±17.7 | NA | 5.15  ±1.1 | NA | ([43](#_ENREF_43), [63](#_ENREF_63)) |
| Peatland (fen) | 69.2 N,  27.3 E | MC (annual) | 781.2 | 473.7 | -27.1 | -37.3 | NA | 10.2 | NA | ([64](#_ENREF_64)) |
| Peatland (fen) | 74.5 N,  21.0 E | EC-no GF (seasonal) | 5133 | 24315 | 7.3 | -35.2 | NA | 42.5 | NA | ([65](#_ENREF_65)) |
| Restored Peatland  [2013] | 38.1 N,  121.6 W | EC-GF (Xannual)  [2014, 2015, 2016, 2017] | 198.6 | 596.8  ±923.6 | -365.3  ±345.3 | 399.8  ±355.2 | NA | 34.5  ±14.2 | NA | ([4](#_ENREF_4), [66](#_ENREF_66)) |
| Restored Peatland  [2000] | 48.0 N,  69.0 W | EC-GF (Xannual)  [2013-2016] | 78.6 | -41.4 | -78.7 | -90 | 6.9 | 4.4 | NA | ([67](#_ENREF_67)) |
| Restored Peatland  [1998] | 52.9 N,  2.8 W | EC-GF (annual)  [2015] | 57.4 | -66.9 | -61.8 | -64.6 | NA | 2.8 | NA | ([68](#_ENREF_68)) |
| Restored Peatland  [2009] | 52.9 N,  2.8 W | EC-GF (annual)  [2015] | 260.0 | 148.8 | -36.9 | -42 | NA | 5.1 | NA | ([68](#_ENREF_68)) |
| Restored Peatland  [2008] | 55.3 N,  112.5 W | MC (seasonal)  [2011-2012] | 268 | 111.4 | -26.3 | -30 | NA | 3.7 | NA | ([69](#_ENREF_69)) |
| Rewetted Peatland  [1995] | 52.3 N,  0.3 E | EC  (annual)  [2013,2014,  2015] | NA | 487 | 132.8 | -123 | NA | 0 | NA | ([52](#_ENREF_52)) |
| Rewetted Peatland  [1984] | 53.0 N,  7.5 E | MC (annual)  [2010,2011] | 0 | 549.8 | -57.6 | -71.4 | NA | 13.9 | NA | ([70](#_ENREF_70)) |
| Rewetted Peatland  [2005] | 53.0 N,  7.5 E | MC (annual)  [2010,2011] | 6.3 | -232.5 | -96.4 | -98.7 | NA | 2.4 | NA | ([70](#_ENREF_70)) |
| Rewetted Peatland  [2013] | 53.0 N,  8.0 W | MC (annual)  [2014-2015] | NA | 1499.7 | 361.5 | 358.5 | NA | 3.1 | NA |  |
| Rewetted Peatland  [2002] | 55.2 N,  9.6 W | MC (annual)  [2008-2013] | 164 | 157.3 | -95 | -104 | NA | 9 | NA | ([71](#_ENREF_71)) |
| Restored FW marsh  [2010] | 38.0 N,  121.8 W | EC-GF (Xannual)  [2011, 2012, 2013, 2015, 2016, 2017] | 286.2 | 2275.5  ±908.9 | -183.3  ±205.7 | -235.8  ±208 | NA | 52.5  ±11.6 | NA | ([4](#_ENREF_4), [66](#_ENREF_66)) |
| Restored FW marsh  [1997] | 38.1 N,  121.6 W | EC-GF (Xannual)  [2012-2017] | 299.4  ±259.6 | 1037.1  ±1226.8 | -404.5  ±213.5 | -449.4  ±206.0 | NA | 44.9  ±8.5 | NA | ([4](#_ENREF_4)) |
| Restored FW marsh  [2002] | 55.9 N,  8.4 E | EC-GF (annual)  [2009-2011] | 266 | 184.4 | -207.8 | -142.3 | NA | 10.5 | NA | ([72](#_ENREF_72)) |

Supplementary Table 2: Summary of the references used for this meta-analysis, regarding the cost-effectiveness of wetlands restoration.

Please see the associated Excel Spreadsheet



Supplementary Figure 1: Boxplots for mangrove and inland wetlands presenting (a) net ecosystem exchange (NEE); (b) aquatic exchange over NEE; (c) CH4 fluxes; (d) CO2:CH4 ratio (that sums all the CO2 and CH4 inputs and outputs). Boxes span the interquartile range (25-75% quartiles), whiskers 5-95% of observations, horizontal lines are the medians and circle points represent the outliers. Letters indicate significant differences between wetlands when n>2 (non-parametric Van de Warden Test, p<0.05). \*Value for mangrove is not from a particular study site but from a global synthesis from ([10](#_ENREF_10)).

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1. One-off restoration events were recorded as occurring for 1 year, and any unspecified events were clarified with the relevant corresponding authors. [↑](#footnote-ref-1)
2. Most studies in our sample only reported capital costs (e.g. land acquisition and one-off restoration activities). Only one study reported ongoing operation costs (e.g. maintenance), while 10 reported monitoring costs; but since this was not done consistently, such information could not be adequately incorporated into this analysis. [↑](#footnote-ref-2)