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**Supplementary Information**

# River bank instability from unsustainable sand mining in the lower Mekong River

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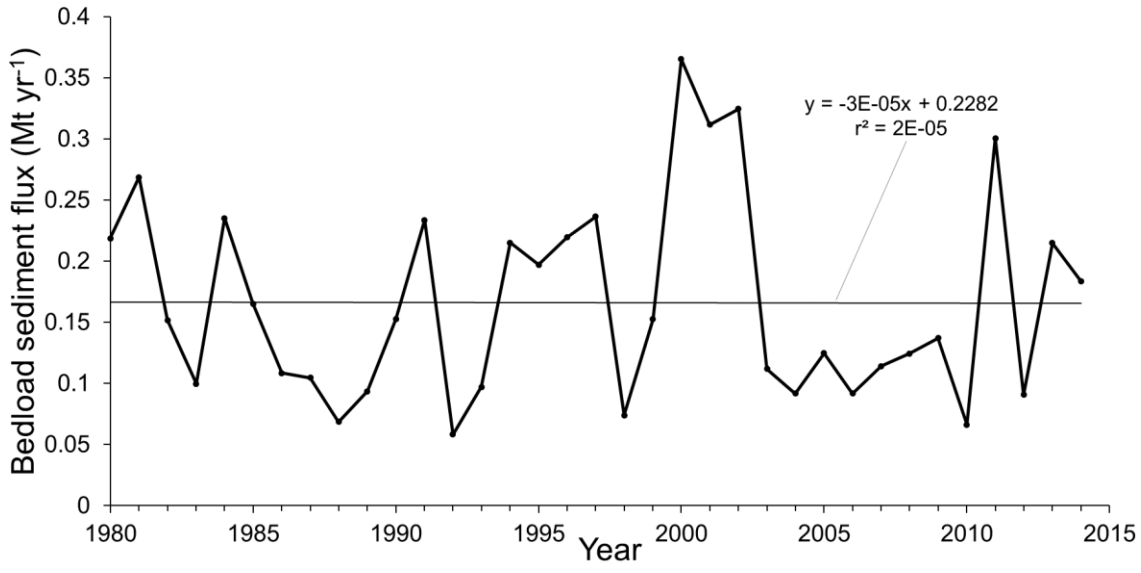


**Supplementary Figure 1:** Long term trends in annualised bedload sediment flux (Mt $yr^{-1}$) over the period 1980 to 2014 estimated using the historic discharge record from Kratie, Cambodia, highlighting the long term linear trend in bedload sediment flux.

**Supplementary Table 1**: Site characteristics for survey locations

| Date | Survey Site ID | Lat | Long | Q (m3 $s^{-1}$) | Max depth (m) | Mean depth (m) | Mean cross-section velocity (m $s^{-1}$) | Channel Mass Flux (Kg/s) |
|---|---|---|---|---|---|---|---|---|
| Sept 2013 | 1 | 11.81287 | 104.99137 | 25000 | 42.3 | 21.6 | 1.25 | 1.458 |
| Sept 2013 | 2 | 11.94926 | 105.19539 | 27000 | 42.1 | 20.2 | 1.22 | 3.790 |
| Sept 2013 | 3 | 12.26019 | 105.80312 | 30000 | 29.7 | 23.1 | 1.15 | 2.374 |
| Sept 2013 | 4 | 12.26019 | 105.80312 | 49000 | 20.4 | 16.6 | 1.65 | 28.201 |
| Sept 2013 | 5 | 12.26152 | 105.98770 | 55000 | 29.4 | 21.9 | 2.14 | 14.232 |
| Oct 2013 | 2 | 11.94926 | 105.19539 | 15500 | 40.1 | 13.3 | 0.79 | 14.909 |
| Oct 2013 | 3 | 12.26019 | 105.80312 | 14500 | 27.5 | 20.1 | 0.70 | 4.529 |
| Oct 2013 | 4 | 12.26019 | 105.80312 | 14400 | 13.5 | 10.4 | 0.58 | 8.723 |
| Oct 2013 | 5 | 12.26152 | 105.98770 | 14000 | 21.2 | 11.4 | 0.59 | 2.939 |
| July 2014 | 2 | 11.94926 | 105.19539 | 27000 | 40.3 | 20.1 | 1.11 | 7.145 |
| July 2014 | 4 | 12.26152 | 105.98770 | 29000 | 17.7 | 13.0 | 1.30 | 3.179 |
| July 2014 | 6 | 12.46544 | 106.01929 | 34000 | 22.5 | 15.0 | 1.58 | 14.046 |

***Supplementary Table* 2:** Median grain size and percentage sand, silt and clay of bed material and suspended load for the six sites surveyed.

| ***Survey Site*** | ***Lat.*** | ***Long.*** | ***Bedload*** | ***Suspended Sediment*** | | |
|---|---|---|---|---|---|---|
| | | | **$D_{50}$ (µm)** | **%Sand** | **%Silt** | **%Clay** |
| *1* | 11.81287 | 104.99137 | 350 | 3 | 62 | 34 |
| *2* | 11.94926 | 105.19539 | 366 | 6 | 66 | 28 |
| *3* | 11.89619 | 105.39720 | 211 | 14 | 63 | 23 |
| *4* | 12.26019 | 105.80312 | 352 | 13 | 63 | 24 |
| *5* | 12.26152 | 105.98770 | 383 | 5 | 63 | 29 |
| *6* | 12.46544 | 106.01929 | 500 | 19 | 56 | 25 |

***Supplementary Table 3*:** Estimates of the depth of sand deposits across the Lower Mekong Basin in Cambodia and Vietnam.

| ***Lat*** | ***Lon*** | ***Location*** | ***Depth of bedrock*** | ***Sand deposit thickness*** | ***Description*** | ***Citation*** |
|---|---|---|---|---|---|---|
| *Unreported* | *Unreported* | Kampong Cham Bridge | | 44.5 m | Borehole | Kubo (2008) |
| *Unreported* | *Unreported* | National Road 6A Bridge | 27 m | | Borehole | Kubo (2008) |
| *Unreported* | *Unreported* | National Road 6A upstream of 2. | 29.5 m | 9 m | Borehole | Kubo (2008) |
| *Unreported* | *Unreported* | Prek Tnaot | 36.5 m | 21 m | Borehole | Kubo (2008) |
| *Unreported* | *Unreported* | Chroy Chang Var Bridge | 17.4 m | >9 m | Borehole | Kubo (2008) |
| *Unreported* | *Unreported* | Phnom Penh (SE) | >37 m | | Borehole | Kubo (2008) |
| *Unreported* | *Unreported* | Kandal Province | | >100 m | Borehole | Kubo (2008) |
| *11°43.833" N* | *104° 57.85' E* | End of abandoned channel on Mekong River west bank | > 25 m | | Core | Kazukai et al. (2007) |
| *11°43.833" N* | *104° 57.75' E* | East bank of the Bassac River | > 10.5 m | > 6m | Core | Kazukai et al. (2007) |
| *12°00.983" N* | *104° 46.033' E* | Floodplain on west bank of the Tonlé Sap River | > 7m | 1 m | Core | Kazukai et al. (2007) |
| *11°43.833" N*<br>*11°28.823"N*<br>*12°00'983"N* | *104°57.85" E*<br>*104°57.75" E*<br>*104°46.033' E* | Several cores and boreholes through the Mekong delta | 38 – 52 m | 24 - 42 m | Borehole | Kazukai et al. (2007) |
| *11°28.829' N* | *105° 07.207' E* | | > 30.5 m | 0 | Core | Tamura et al. (2009) |

| | | | | | | |
|---|---|---|---|---|---|---|
| *11° 11.547′ N* | *105° 16.638′ E* | Natural levee east bank of Mekong River 20 km SE of PP | | 0 | Core | Tamura et al. (2009) |
| *11°57.558′ N* | *105° 03.613′ E* | Floodplain on west bank of the Bassac River | | 0 | Core | Tamura et al. (2009) |
| *11°28.2′ N* | *105° 07.8′ E* | 20 km southeast of PP in Kean Svay District (floodplain) | >31 m | 17 m | Core | Tamura et al. (2007) |
| *Unreported* | *Unreported* | CHIRP seismic data from Mekong delta offshore | | 22m | Core | Liu et al. (2017) |
| *11°27.023'N* | *105°05.149'E* | Aquifer thickness estimated from resistivity surveys between the Mekong and Bassac river channels | | >25 m | Resistivity measurements | Uhlemann et al. (2017) |

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