

CORRESPONDENCE:

# Tidal river management in Bangladesh

**To the Editor** — The study by Auerbach *et al.*<sup>1</sup> advances understanding of the drivers of flood risk in natural and embanked regions of the coastal and tidal regions of Bangladesh. The quantification of sedimentation rates and how effectively periodic opening and closing of polders may result in elevation recovery is valuable in the context of reducing the vulnerability of coastal Bangladesh [Au:OK?] to flooding in the twenty-first century.

However, we are surprised at the authors' apparent lack of awareness of the long-practiced protocol called tidal river management (TRM) and its successful implementation for over a decade in coastal Bangladesh<sup>2,3</sup>. TRM involves the periodic cutting and closing

of polders to accelerate land accretion (or reclamation). TRM as a concept has been around since the 1990s and has been practised or analysed by many local stakeholder entities such as the Institute of Water Modelling of Bangladesh for elevation recovery in several (embanked) regions in coastal Bangladesh. Thus, the management strategy advocated by Auerbach *et al.*<sup>1</sup> is not so innovative [Au:OK? novel removed for style].

In summary, we commend the authors' quantitative work on understanding flood risk on embanked polder regions. However, the Letter could be more cognizant of previous studies and could have benefited by learning from local wisdom to potentially make their research more useful to the local stakeholders<sup>4</sup>. □

References

1. Auerbach, L. W. *et al.* *Nature Clim. Change* **5**, 153–157 (2015).
2. Haque, K. N. H., Chowdhury, F. A. & Khatun, K. R. in *Land and Disaster Management Strategies in Asia* (ed. Ha, H.) (Springer, 2015). [Au:please provide chapter/page range for the section being cited]
3. Khadim, F. K., Kar, K. K., Halder, P. K., Rahman, M. A. & Morshed, A. K. M. *J. Wat. Resour. Protect.* **5**, 953–961 (2013).
4. Hossain, F. *et al.* *Bull. Am. Meteorol. Soc.* **95**, 1201–1207 (2014).

Faisal Hossain<sup>1</sup>, Zahirul Haque Khan<sup>2</sup> and C K Shum<sup>3</sup> [Au:please check addresses and provide an e-mail address for correspondence]

<sup>1</sup>Department of Civil and Environmental Engineering [Au:correct?], University of Washington, Seattle, 98195 Washington, USA. <sup>2</sup>Coast, Ports, Estuary Division, Institute of Water Modelling (IWM), Dhaka, Bangladesh [Au:please provide zip code]. <sup>3</sup>School of Earth Sciences, Ohio State University, Columbus, Ohio 43210, USA.

## Reply to 'Tidal river management in Bangladesh'

**Auerbach *et al.* reply** — We appreciate the opportunity to address tidal river management (TRM), as raised by Hossain and colleagues<sup>1</sup>. We are well aware of TRM but made the decision not to include TRM in our Letter<sup>2</sup> on managing flood risk on the Ganges-Brahmaputra tidal delta plain for the following reasons.

First and foremost, our Letter<sup>2</sup> concerns a major disaster that displaced >100,000 people and flooded an anthropogenically degraded landscape for nearly two years. These circumstances, and our finding that decimetres of sandy, salt-rich sediment unsuitable for agriculture were deposited, do not lead to a simple endorsement of TRM.

Second, TRM presents neither a simple engineering solution nor one that is socially or politically straightforward. Beyond the TRM implementations noted by Hossain and colleagues<sup>1</sup>, there have been well-documented failures resulting from both engineering challenges<sup>3</sup> and lack of proper social discourse<sup>4</sup>. Although these occurrences do not discount the potential benefits of TRM<sup>5–7</sup>, they do preclude an

unqualified prescription in the context of our Letter.

Third, sites where TRM has been used lie >50 km inland of Polder 32 — where the physical environment is considerably different, with reduced tidal energy and less saline surface waters. Furthermore, the area of TRM test sites is about a third of the size of Polder 32, and together these areas comprise <1% of the 5,000 km<sup>2</sup> of southwest Bangladesh. Thus to consider the application of TRM across the region is premature [Au:OK?].

We regret any misperception that we sought to proclaim a 'new' or 'innovative' approach [Au:OK? to match Hossain]. In hindsight, it would have been appropriate to cite relevant TRM literature in our Letter, and we are thankful to do so here. However, given the region's non-uniform social and physical landscapes and the relatively limited application of TRM, the results of our study cannot provide direct support for TRM as a comprehensive management strategy. This should not discount continued development of the practice or exploration of its potential benefits. □

References

1. Hossain, F., Khan, Z. H. & Shum, C. K. *Nature Clim. Change* **5**, xxx–xxx (2015).
2. Auerbach, L. W. *et al.* *Nature Clim. Change* **5**, 153–157 (2015).
3. Rahman, A. *Beel Dakatia: The Environmental Consequences of a Development Disaster* (University Press, Bangladesh, 1994).
4. Villagers attack whip's motorcade in Jessore. *Daily Sun* (3 June 2012); <http://go.nature.com/4Zs9XX>
5. Shampa, M. & Pramanik, I. M. *Int. J. Sci. Technol. Res.* **1**, 1–6 (2012).
6. Tutu, A. *Particip. Learn. Action* **15**, 117–123 (2005).
7. Islam, M. R. in *Environ. Livelihoods Trop. Coast. Zo.* (Hoanh, C. T. *et al.*) 237–248 (CAB International, 2006). [Au:please provide full title of this book/report]

L. W. Auerbach<sup>1</sup>, S. L. Goodbred Jr<sup>1\*</sup>, D. R. Mondal<sup>2</sup>, C. A. Wilson<sup>1</sup>, K. R. Ahmed<sup>3</sup>, K. Roy<sup>3</sup>, M. S. Steckler<sup>4</sup>, C. Small<sup>4</sup>, J. M. Gilligan<sup>1</sup> & B. A. Ackerly<sup>5</sup>

<sup>1</sup>Department of Earth and Environmental Sciences, Vanderbilt University, Nashville, Tennessee 37240, USA. <sup>2</sup>School of Earth and Environmental Sciences, Queens College–City University of New York, Queens, New York 11367, USA. <sup>3</sup>Environmental Science Discipline, Khulna University, Khulna 9208, Bangladesh. <sup>4</sup>Lamont-Doherty Earth Observatory, Columbia University, Palisades, New York 10964, USA. <sup>5</sup>Department of Political Science, Vanderbilt University, Nashville, Tennessee 37203, USA. \*e-mail: [steven.goodbred@vanderbilt.edu](mailto:steven.goodbred@vanderbilt.edu)