openDELvE: A global database of levees and leveed areas

Joey O’Dell*, Jana R Cox, Jaap H Nienhuis, Doug A Edmonds, and Paolo Scussolini

Department of Earth Sciences, and Department of Physical Geography, Utrecht University, The Netherlands
Department of Earth and Atmospheric Sciences, Indiana University Bloomington, United States of America
Institute for Environmental Studies, Vrije Universiteit Amsterdam, The Netherlands

*Contact is welcomed at data@opendelve.eu or via the webform at www.opendelve.eu

The Problem
People living in coastal deltas face mounting threats, being affected by coastal flooding and sea level rise1, and being affected by diminishing sediment supply2. We build levees to protect our houses and our livelihoods, and despite the fact that levees have an impact on the sediment budget of a delta region, current modelling usually considers them a sub-grid feature3. To accurately model flooding in leveed areas, a global database of verifiable levees was required, but current databases were limited at a country level4.

Verifiable data
It is important that the database is verifiable and trustworthy, and so all data was vetted against a stringent protocol before being added to the database. We used manual and (semi-) automated processing in ArcGIS Pro to discover and unify levee data into a single data structure, so that analyses and models can be run. We include documentation of the decision making processes in our logs and metadata, and publish these with the dataset.

Community-led interaction
The website (www.opendelve.eu) provides both raw data downloads for use in research and policymaking, as well as a freely accessible webviewer for use by anyone without access to GIS software. We also publish the data publicly on the ArcGIS Cloud to maximise reuse possibilities. There is an interactive reporting and improvement tool to aid reception of new data sources and encourage engagement, and maintenance is supported by Utrecht University. As of April 2022 the research dataset has been downloaded 236 times. There is an interactive reporting and improvement tool to aid reception of new data sources and encourage engagement, and maintenance is supported by Utrecht University. As of April 2022 the research dataset has been downloaded 236 times.

Further uses
openDELvE has already been used for comparison against land cover data, and this indicates higher densities of urban areas behind levees5 such as in the Mississippi Delta (left). We recognise that the dataset isn’t complete despite our best efforts to locate data, however the database continues to grow, and revisions and additions are encouraged to be submitted via the website. The data is released with an open-source licence encouraging onward use and editing.

Acknowledgements
Funding for travel and printing costs to present this poster was kindly provided by the NIFD Future Deltas Hub, Utrecht University. The support and guidance of Sue Cox, Alex Curran, Silvia Barbetta, Albert Kettner, Yoshiki Saito, Dhirueh Patel, Fergus Miller Kerins and Maarten Zeylmans van Emmichoven in discovering data, testing the platform and assistance with resources is greatly appreciated and was crucial in production of this project.

References
1. Edmonds et al. (2020) doi:10.3390/w12010119
5. O’Dell et al. (2022) doi:10.1038/s41467-020-18531-4

Community-led interaction
The website (www.opendelve.eu) provides both raw data downloads for use in research and policymaking, as well as a freely accessible webviewer for use by anyone without access to GIS software. We also publish the data publicly on the ArcGIS Cloud to maximise reuse possibilities. There is an interactive reporting and improvement tool to aid reception of new data sources and encourage engagement, and maintenance is supported by Utrecht University. As of April 2022 the research dataset has been downloaded 236 times.

Further uses
openDELvE has already been used for comparison against land cover data, and this indicates higher densities of urban areas behind levees5 such as in the Mississippi Delta (left). We recognise that the dataset isn’t complete despite our best efforts to locate data, however the database continues to grow, and revisions and additions are encouraged to be submitted via the website. The data is released with an open-source licence encouraging onward use and editing.

Acknowledgements
Funding for travel and printing costs to present this poster was kindly provided by the NIFD Future Deltas Hub, Utrecht University. The support and guidance of Sue Cox, Alex Curran, Silvia Barbetta, Albert Kettner, Yoshiki Saito, Dhirueh Patel, Fergus Miller Kerins and Maarten Zeylmans van Emmichoven in discovering data, testing the platform and assistance with resources is greatly appreciated and was crucial in production of this project.

References
1. Edmonds et al. (2020) doi:10.3390/w12010119
5. O’Dell et al. (2022) doi:10.1038/s41467-020-18531-4