



openDELvE: A global database of levees and leveed areas

Joey O'Dell^{a*}, Jana R Cox^b, Jaap H Nienhuis^b, Doug A Edmonds^c, and Paolo Scussolini^d

^a Department of Earth Sciences, and ^b Department of Physical Geography, Utrecht University, The Netherlands

^c Department of Earth and Atmospheric Sciences, Indiana University Bloomington, United States of America

^d Institute for Environmental Studies, Vrije Universiteit Amsterdam, The Netherlands

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

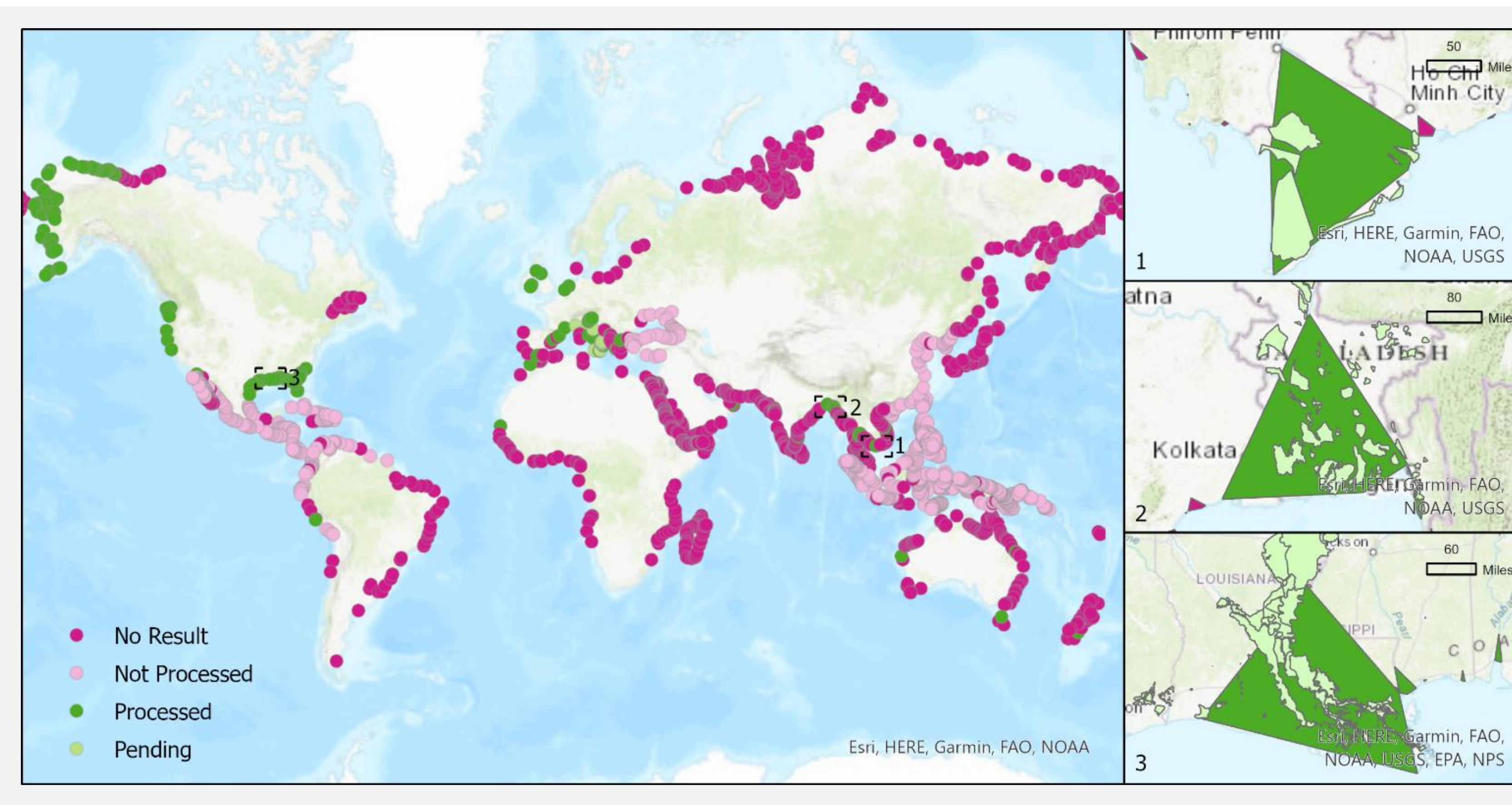


Figure 1 (left)
Global coverage of data in the openDELvE dataset showing insets maps of the following deltas:
1) Mekong
2) Ganges-Brahmaputra
3) Mississippi

Colour status shows data content according to quality control, decision making process and logs are visible as pop-ups within the interactive viewer

Table 1 (below)
Computed statistics comparing openDELvE against delta extent data¹.

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.

UN Region	Number of deltas with data	Total habitable deltaic area (km ²)	Levee protected area (km ²)	Share protected by levees
Africa	3	4,358	570	13%
Americas	100	99,262	15,282	15%
Asia-Pacific	19	128,970	25,396	20%
Europe & C. Africa	30	6,454	3,486	54%

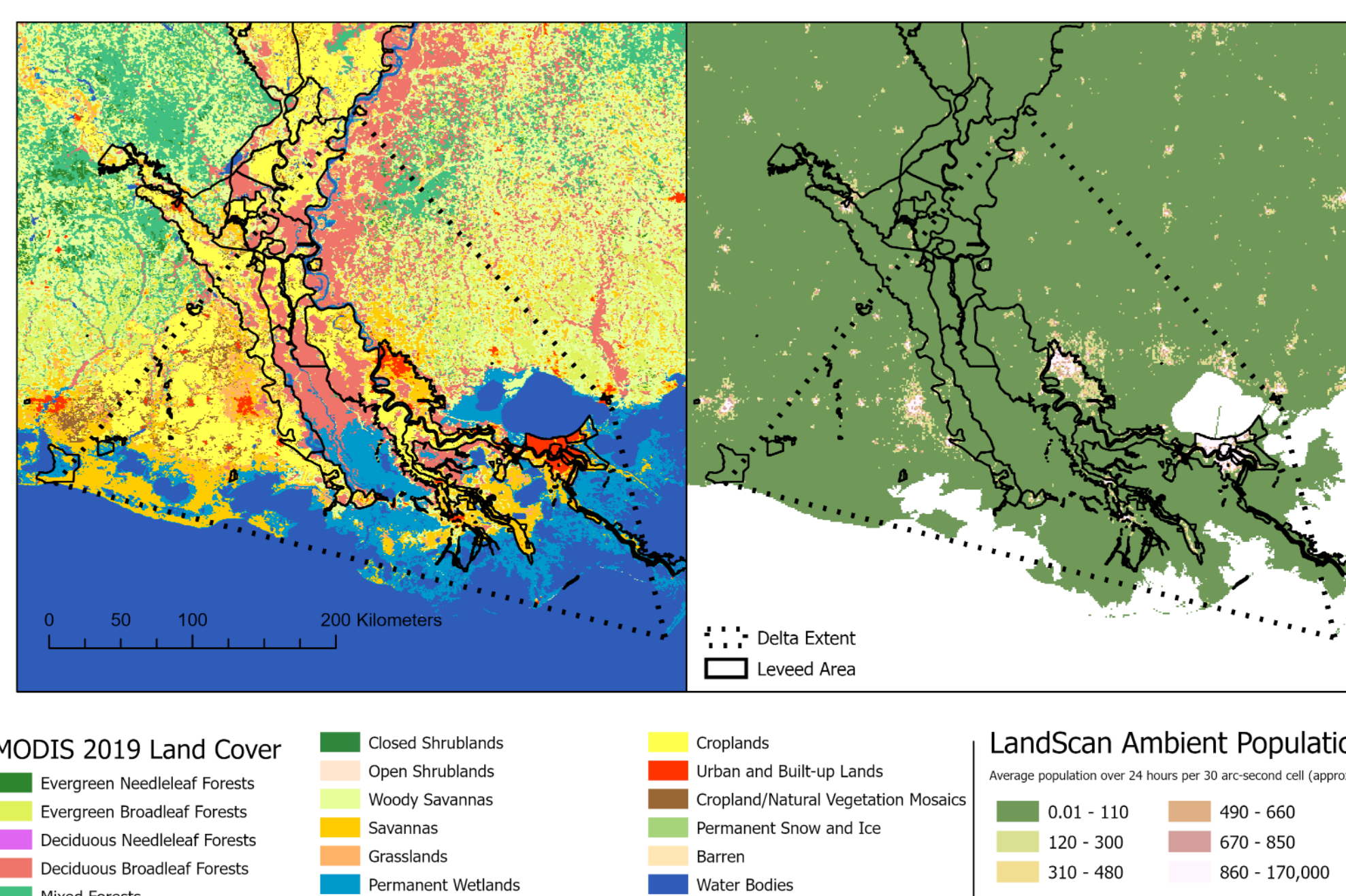


Figure 2 (left)
Use of openDELvE data in evaluation of land cover and ambient population with regard to leveed areas in the Mississippi Delta

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.

References

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About the lead author

Joey O'Dell is an MSc student in Earth Sciences at Utrecht University in the Netherlands, specialising in sedimentology and (geospatial) data management. He studied BSc (Hons) Geology at the University of Portsmouth, UK and is a Fellow of The Geological Society of London.

Twitter: @joey_geoloog

