



## Newsletter of the Unesco Land Subsidence International Initiative

Vol.46, March 2024

Send your comments and suggestions to [John.Lambert@deltares.nl](mailto:John.Lambert@deltares.nl)

### New Literature

#### **General**

Shaowei Wang, Jin Xu, Jiangbo Xu,

Parallel finite layer method for land subsidence and its homotopy parameter inversion,

<https://doi.org/10.1016/j.envsoft.2024.105997>.

(<https://www.sciencedirect.com/science/article/pii/S1364815224000586>)

#### **Iran, Bardaskan Aquifer**

Mehdi Eghbali et al.,

Determining land subsidence potential using the evidential belief function model: A case study for the Bardaskan Aquifer, Iran

<https://onlinelibrary.wiley.com/doi/full/10.1111/nrm.12397>

#### **Iran, Arak Plain**

Nazanin Shahkaram et al.,

Temporal Analysis of Land Subsidence and Groundwater Depletion Using the DInSAR and Kriging Methods: A Case Study and Insights

<https://ascelibrary.org/doi/10.1061/JHYEFF.HEENG-6130>

#### **Iran, Kashmar Plain, Semnan Plain**

Elham Hosseinzadeh et al.,

Evaluating Machine Learning-Based Approaches in Land Subsidence Susceptibility Mapping

<https://www.mdpi.com/2073-445X/13/3/322>

***Mexico, Mexico City***

Solano-Rojas, D., Wdowinski, S., Cabral-Cano, E. et al. Geohazard assessment of Mexico City's Metro system derived from SAR interferometry observations. *Sci Rep* 14, 6035 (2024).

<https://doi.org/10.1038/s41598-024-53525-y>

***The Netherlands,***

Helfenstein, A., Mulder, V.L., Heuvelink, G.B.M. et al.

Three-dimensional space and time mapping reveals soil organic matter decreases across anthropogenic landscapes in the Netherlands. *Commun Earth Environ* 5, 130 (2024).

<https://doi.org/10.1038/s43247-024-01293-y>

***PR China, Beijing***

Min Shi, Mingliang Gao, Zheng Chen, et al. Land subsidence in Beijing: response to the joint influence of the South-to-North Water Diversion Project and ecological water replenishment, observed by satellite radar interferometry, *GIScience & Remote Sensing*, 2024, 61(1): 2315708 .

DOI: 10.1080/15481603.2024.2315708

<https://www.tandfonline.com/doi/full/10.1080/15481603.2024.2315708>

***PR China, Beijing-Tianjin-Hebei region***

Jing Leng, Mingliang Gao, Huili Gong, et al.

Spatio-temporal prediction of regional land subsidence via ConvLSTM. *J. Geogr. Sci.* 2023, 33, 2131–2156. DOI: 10.1007/s11442-023-2169-8

<https://link.springer.com/article/10.1007/s11442-023-2169-8>

***PR China, Tianjin Region***

Kuan Wang et al.,

Preventing Subsidence Reoccurrence in Tianjin: New Preconsolidation Head and Safe Pumping Buffer

DOI: 10.1111/gwat.13406

[https://www.researchgate.net/publication/379182483\\_Preventing\\_Subsidence\\_Reoccurrence\\_in\\_Tianjin\\_New\\_Preconsolidation\\_Head\\_and\\_Safe\\_Pumping\\_Buffer/references](https://www.researchgate.net/publication/379182483_Preventing_Subsidence_Reoccurrence_in_Tianjin_New_Preconsolidation_Head_and_Safe_Pumping_Buffer/references)

### ***Tunisia, Cap Bon Peninsula***

R. Abdelfattah, "Land Subsidence and Surface Water Extent Relationship Assessment Using Sentinel 1 & 2 Data in the Cap-Bon Peninsula in Tunisia," IGARSS 2023 - 2023 IEEE International Geoscience and Remote Sensing Symposium, Pasadena, CA, USA, 2023, pp. 2866-2869, doi: 10.1109/IGARSS52108.2023.10283317.

keywords: {Satellite constellations;Time series analysis;European Space Agency;Land surface;Sea measurements;Geoscience and remote sensing;Coherence;InSAR;P-SBAS;time series land subsidence;water surface;aquifer},

<https://ieeexplore.ieee.org/document/10283317>

### ***USA, Coastal Cities***

Ohenhen, L.O., Shirzaei, M., Ojha, C. et al. Disappearing cities on US coasts. Nature 627, 108–115 (2024). <https://doi.org/10.1038/s41586-024-07038-3>

### ***PR China, Northern Henan Province***

Huabin Chai et al.,

Monitoring Analysis of Urban Subsidence in Northern Henan Province Based on TS-InSAR Technology

[https://www.researchgate.net/publication/378849208\\_Monitoring\\_Analysis\\_of\\_Urban\\_Subsidence\\_in\\_Northern\\_Henan\\_Province\\_Based\\_on\\_TS-InSAR\\_Technology](https://www.researchgate.net/publication/378849208_Monitoring_Analysis_of_Urban_Subsidence_in_Northern_Henan_Province_Based_on_TS-InSAR_Technology)

### ***PR China, Tianjin Plain***

Zhao Long et al.,

Unraveling influencing hydrogeological factors contributing to land subsidence in the Tianjin Plain of China by a multi-scale geographically weighted regression model and monitoring data

<https://www.lyellcollection.org/doi/abs/10.1144/qjegh2023-068>

### ***Vietnam, Ho Chi Minh City***

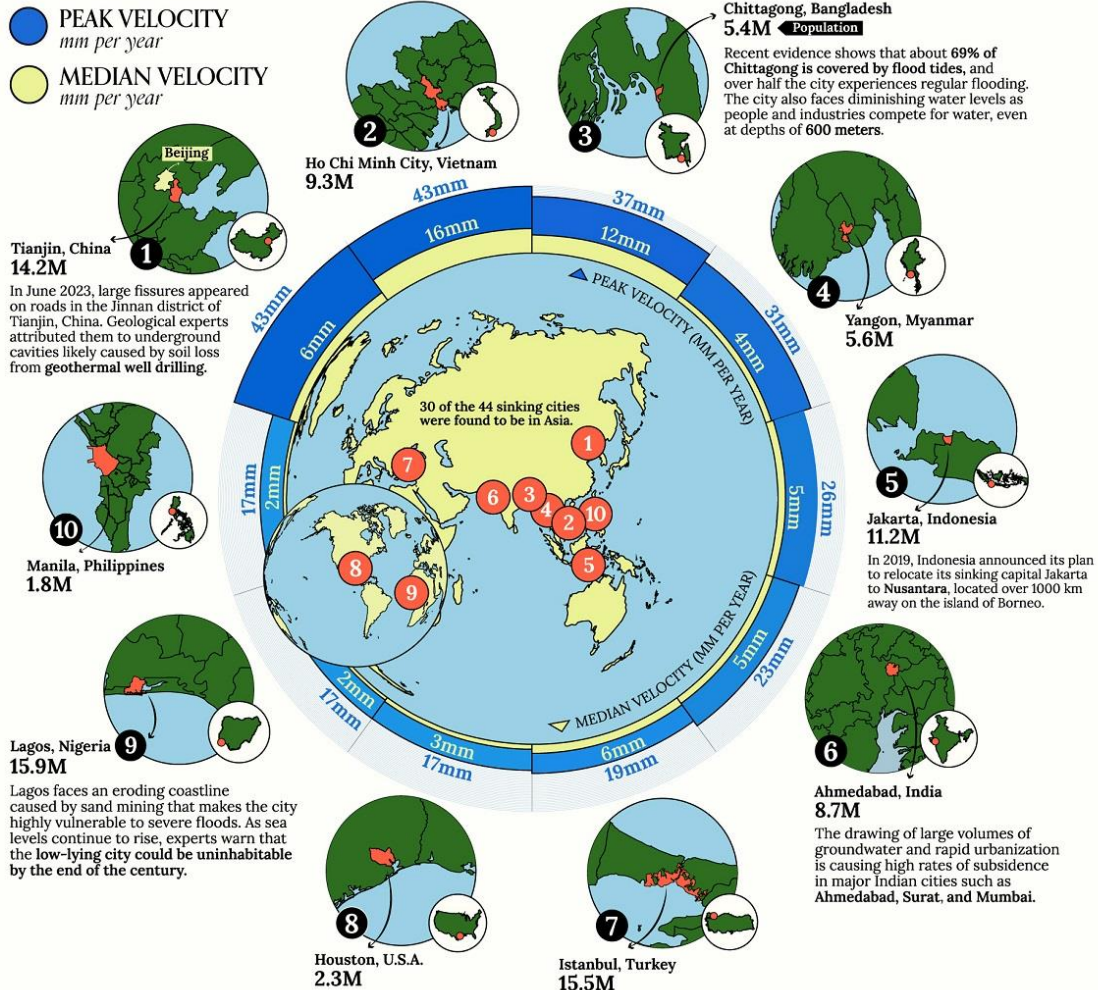
Vu Thi Phuong Thao et al.,

Reliability assessment of land subsidence monitoring results using PSI technique in Ho Chi Minh City, Vietnam

<https://www.tandfonline.com/doi/full/10.1080/00207233.2024.2324623>

# The World's Fastest-Sinking Coastal Cities

Between 2014 to 2020, researchers used satellite-based radar to measure the relative local land subsidence velocities for 48 of the largest coastal cities. They found that over 44 cities have areas that are sinking faster than sea levels are rising, with areas in some cities experiencing subsidence rates over 20mm/year.

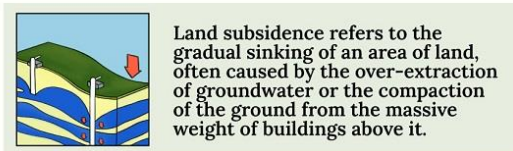


## Other major coastal cities experiencing fast rates of relative land subsidence

MEDIAN VELOCITY\*  
mm per year



Land subsidence has caused significant damages to transportation networks, public utilities, and other infrastructures in parts of China.

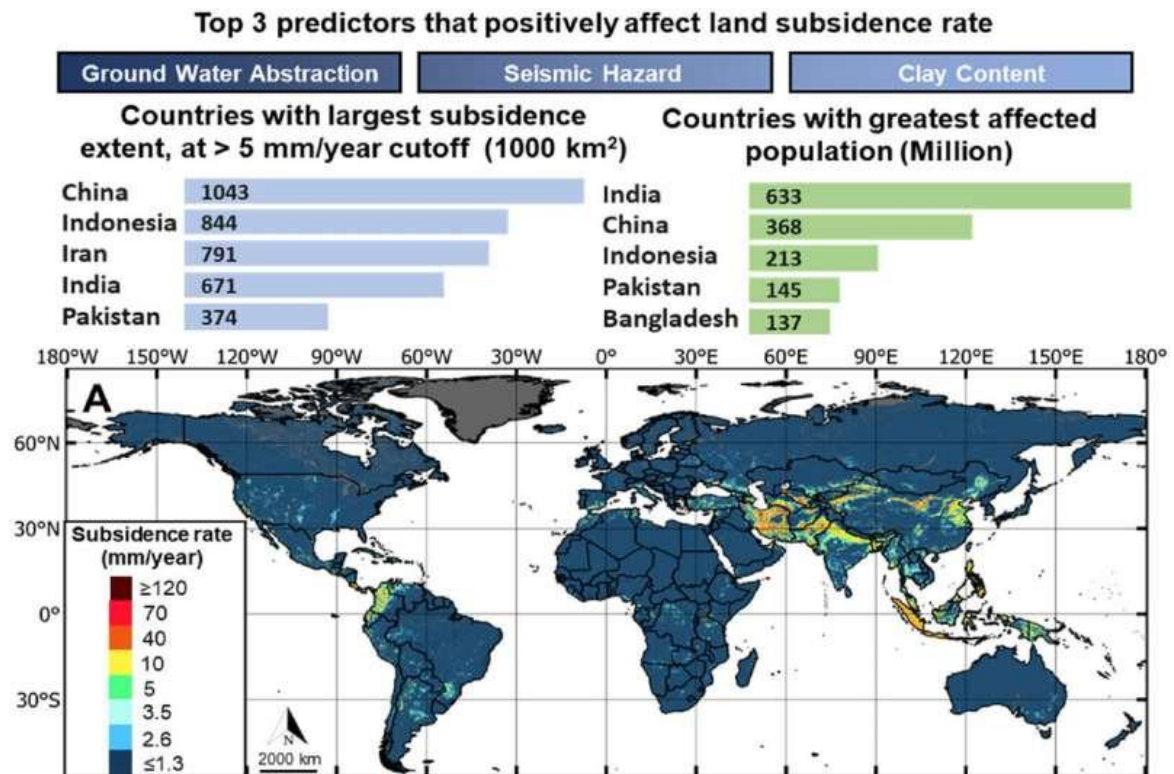




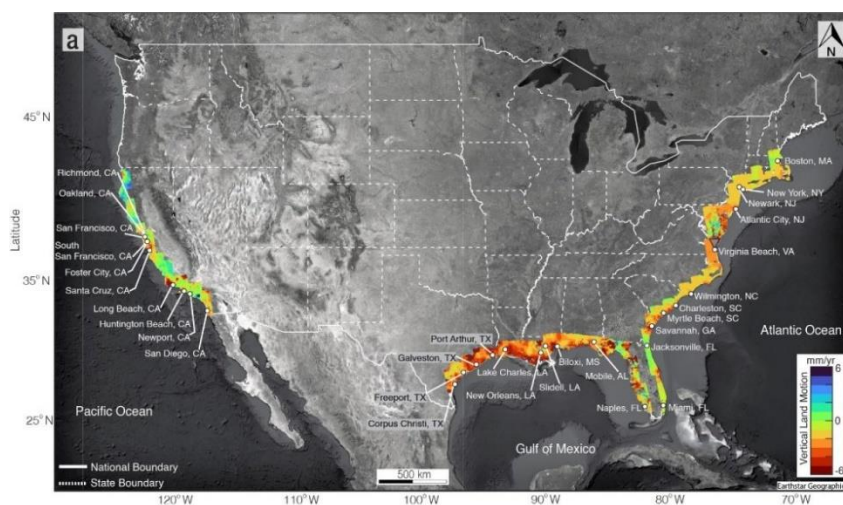
Nearly 2 billion people globally at risk from land subsidence

by Hannah Bird

<https://phys.org/news/2024-03-billion-people-globally-subsidence.html#:~:text=Land%20subsidence%20is%20a%20geohazard,the%20removal%20of%20su%20surface%20material.>



### USA, Coastal Cities



<https://news.vt.edu/articles/2024/01/research-sinkingcoasts.html>

## Mining

Wita, P., Szafraniec, J.E., Absalon, D. et al. Lake bottom relief reconstruction and water volume estimation based on the subsidence rate of the post-mining area (Bytom, Southern Poland). *Sci Rep* 14, 5230 (2024). <https://doi.org/10.1038/s41598-024-55963-0>

Avchar, A., Pal, S.K., Tripathi, A.K. et al. Subsidence Analysis for Old Abandoned Board and Pillar Coal Mines Using ANSYS and Monte Carlo Simulation. *J Min Sci* 59, 938–948 (2023). <https://doi.org/10.1134/S1062739123060078>

From the Press

**Greece**

Land subsidence due to groundwater exploitation in Greece

<https://www.ecohubmap.com/hot-spot/land-subsidence-due-to-groundwater-exploitation-in-greece/bxllu6w49sz>

**Italy**

Land subsidence due to groundwater exploitation in Italy

<https://www.ecohubmap.com/hot-spot/land-subsidence-due-to-groundwater-exploitation-in-italy/bxllu6wtvg9>

**Italy, Bacteria**

'If the sea rises we'll have to leave': plans to restart gas drilling threaten Italy's sinking delta

<https://www.theguardian.com/environment/2024/mar/04/if-the-sea-rises-well-have-to-leave-plans-to-restart-gas-drilling-threaten-italys-sinking-delta>

**The Netherlands, Flevoland**

Land Subsidence Crisis Hits Netherlands: Flevoland Faces Unique Challenges

<https://bnnbreaking.com/world/netherlands/land-subsidence-crisis-hits-netherlands-flevoland-faces-unique-challenges>

**Uzbekistan**

Uzbekistan in top 5 in terms of mean subsidence rates

Scientists found that there was a significant positive correlation between the rate of groundwater abstraction and the subsidence rates. That is, these areas need efficient use of water to reduce this geological risk.

<http://tashkenttimes.uz/national/12610-uzbekistan-in-top-5-in-terms-of-mean-subsidence-rates>

**Vietnam, Mekong Delta**

Mekong Delta facing serious drought, saltwater intrusion, land subsidence

<https://en.sggp.org.vn/mekong-delta-facing-serious-drought-saltwater-intrusion-land-subsidence-post108521.html>