Subsidence in megacities on the coast greater than absolute sea level rise
In many coastal cities, the ground is now sinking faster than the sea level is rising due to climate change. This subsidence is the result of human activity, namely the pumping of groundwater. Parts of Jakarta, Ho Chi Minh City, Bangkok and many other coastal cities have already sunk or are threatening to sink below sea level. Deltares Research Institute studied the subsidence in five coastal megacities: Jakarta, Ho Chi Minh City, New Orleans, Dhaka and Bangkok and listed out solution directions. These are presented at the American Geophysical Union by Gilles Erkens, geologist at Deltares Research Institute and Utrecht University.

An under-appreciated problem: subsidence costs billions annually
The total damage due to subsidence worldwide is estimated at billions of dollars a year. In the future, this will only increase, with population and economic growth. Subsidence is an underrated problem worldwide. How much and how quickly it can proceed is apparent in North Jakarta, where the city has sunk four metres in the last 35 years, a fall of 10-20 cm per year. The consequences include increased flood risk, as areas flood easier and remain flooded for longer. In addition, ground deformation causes significant economic losses in the form of structural damage and high maintenance costs for roads, railways, dikes, water pipes, pumping stations and buildings.

Groundwater extraction is the primary cause of subsidence
Groundwater extraction is the primary cause of severe subsidence in the megacities, but this is also where the solution lies. Action by individual cities is required to mitigate or adapt to subsidence. This is in contrast to climate-driven sea level rise which is a global problem and asks for global action, which cannot be organised by the individual cities. The assessment study by Deltares includes a couple of best practise examples of cities that successfully combated subsidence, as inspiration for other coastal cities.

Governments unaware of subsidence problem
Governmental agencies and inhabitants are often not aware that subsidence is an urgent problem. A different way of thinking and an integral approach are needed to stop subsidence. The present reaction to a flood is more often to build a barrier. But in sinking cities, in due time, the barriers will no longer suffice, because the actual cause of the problem – the extraction of groundwater – has not been addressed. Subsidence must be included along with water safety in the planning processes for the medium and long term. This asks for good predictions of future subsidence rates, which are currently unavailable. The earth science community plays an important role in making reliable subsidence predictions. In their future scenarios, many governments only target the consequences of climate driven sea level rise, but subsidence is an equally urgent issue. The sea is rising by three to ten millimetres a year; the ground may sink up to 100 mm a year.