Geomatics and Climate Change

Changes in the extent and thickness of glaciers, ice sheets and snow cover are indicators of temperature changes and thus climate change. If all the ice covering Greenland, the Arctic and Antarctica were to melt, the sea level would rise by 65 metres. But such a scenario is highly unlikely. Today's estimates of sea level rise up until the year 2100 range from 0.25% to 2.5% of this figure. Climate change also intensifies rainfall. Therefore, not only the risk of coastal zone flooding increases but also river flooding – and the risk is amplified by asphalting, concreting and paving of many landscapes due to urbanisation. The geomatics industry designs and develops software tools enabling reliable geodata analysis, and surveyors can play in a role in monitoring, mitigating and adapting to climate change. Read on to find out how.

Climate change is nothing new. Some ten thousand years ago, northern Europe and northern America were covered by thick ice sheets and the average annual temperature was 6^{o}C lower than today. During the 1930s Kentucky, USA, was hit by severe drought. Following decades of extensive farming, dust storms blew the fertile soil from the prairies transforming millions of hectares into wasteland. The financial recklessness of the 'Roaring Twenties' had persuaded many farmers that purchasing a tractor on credit would make them wealthy. But the drought bankrupted hundreds of thousands of peasants and the banks took possession of their collateral. "The bank is something more than men, I tell you. It's the monster. Men made it, but they can't control it," wrote John Steinbeck in *The Grapes of Wrath*. Many families migrated to California, a state which itself is nowadays suffering from heavy drought. In 1930 'only' two billion people were living on our planet, but that grew to four billion in the space of just three decades. Today the population numbers over seven billion and by 2050 this will have increased to nine billion but is expected to remain stable in subsequent decades. To put this into perspective: today's 50-year-olds have experienced a doubling of the world population in their lifetime...

To combat global warming, representatives of the United Nations gathered in Paris in December 2015. They talked about limiting the emission of greenhouse gases. Such conferences have taken place annually during the last two decades, and the latest one was aimed at achieving a binding agreement. There was plenty of talk, but talk alone doesn't engender agreements. A country's development is highly correlated with energy consumption, as illustrated by the BRIC countries. China has huge reserves of coal underneath its wastelands and deserts – half the global production of coal stems from China. Will China refrain from mining its natural resources to diminish the flooding risk in the deltas of the rivers Ganges and Brahmaputra constituting Bangladesh? Will India refrain from economic development while half of its population live in poor to dismal conditions? Rather than fighting climate change, fighting poverty will be highest on the agenda. Without a doubt, economic development increases living standards in the short term while the effects of reducing greenhouse gases stretch into the distant future and might appear unpleasantly uncertain. In the meantime, geomatics specialists scrutinise their possible roles in halting climate change. Radar altimetry, optical Earth observation satellites, airborne Lidar, orbiting gravity sensors and digital cameras provide data on changes of elevation, land uses, water storage, ice mass balances and so on. Geodata is also needed for responding to flooding while its worth depends on proper time tags and georeferencing. The geomatics industry designs and develops software tools enabling reliable geodata analysis. FIG Publication 65, edited by John Hannah and published in September 2014, provides a thorough overview of the role surveyors can possibly play in monitoring, mitigating and adapting to climate change (www.fig.net/resources/publications/figpub/pub65/figpub65.asp).

Mathias Lemmens, senior editor, GIM International