



# Flood risk in Brazil



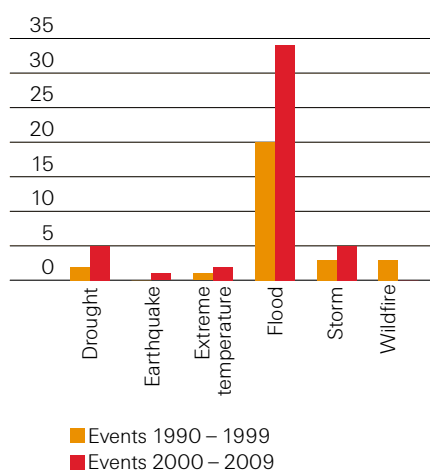


## Flooding in Brazil poses increased risk to people, infrastructure and business

River and flash floods combined with landslides have been a risk in Brazil throughout its history. Although natural catastrophes were not considered a strong threat in the past, the country's rapid socio-economic development, with increasing concentration of people and economic activity in urban areas, has significantly increased both impacts and subsequent economic losses in the past decade. On average, major floods in Brazil have killed almost 120 people a year and caused annual economic losses of about USD 250 million during this period.<sup>1</sup> Looking ahead, climate change is likely to increase the frequency and severity of intense precipitation in the region, a major cause of flooding.

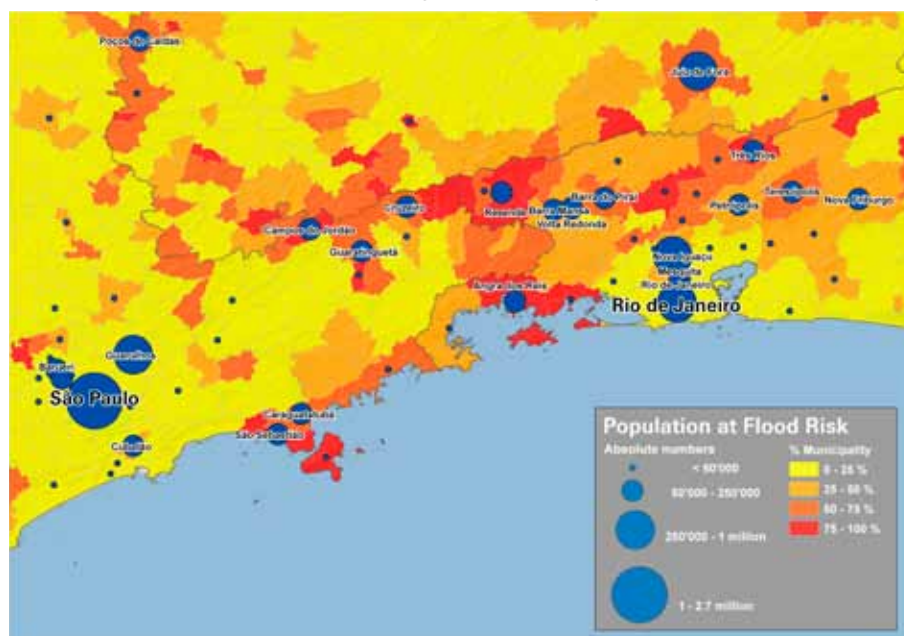
According to Swiss Re estimates about 19 million people (9.4% of total population) are exposed to river flood risk, and about 14 million people (6.9% of the population) to flash flood risk. The metropolitan areas and economic strongholds of the country's Southeastern states are particularly vulnerable, also with regard to possible obstruction of critical transportation thoroughfares and energy supplies (figures 1, 2, 3).

### Increase of flood events in Brazil in the last decade



Source: EM-DAT: The OFDA/CRED International Disaster Database

**Figure 1: Flood risk hot spots, municipality level: Population exposed to river and flash flood risk in the Southeastern highly populated region of Brazil<sup>2</sup>**



Source (for all three maps): Swiss Re GEOservices, © GFK Geomarketing Map Edition World

## How flooding affects different regions and sectors

Besides the direct damage floods and landslides can cause to life, health and assets the economic aspects include losses from business interruption as well as the increased strain on public and personal budgets. The below examples demonstrate how various regions and sectors in Brazil have been impacted by floods in the past ten years, and may also provide a notion of future perils:

- In January 2011 the floods in the Southeastern states of Rio de Janeiro and Sao Paulo killed over 800 people and made more than 100 000 people homeless.
- In January 2010 a landslide caused by heavy rains buried a beach resort in Angra dos Reis in Rio de Janeiro state. Besides the human suffering, local tourist income was also impacted.
- In April 2009 the railroad transporting ores from the major mines in Carajás to the Itaquí port in São Luís was cut off in the Northeastern state of Maranhão. The floods provoked economic losses of USD 500 million in the region.

- In 2008 flooding in the Southern state of Santa Catarina killed 118 people and caused economic losses of USD 400 million. The Itajaí port suffered business interruption losses of USD 35 million per day. In addition, a damaged gas pipeline disrupted the supply of Bolivian gas to the flooded area, and to the state of Rio Grande do Sul, further south.
- In 2004 major floods in 15 states across both North- and Southeastern Brazil cut fruit production by an estimated 10%, causing overall economic losses of USD 303 million.

<sup>1</sup> Swiss Re sigma database. US dollars of 2010.

<sup>2</sup> Intersection of river and flash flood risk zones per km<sup>2</sup> and population per km<sup>2</sup>.

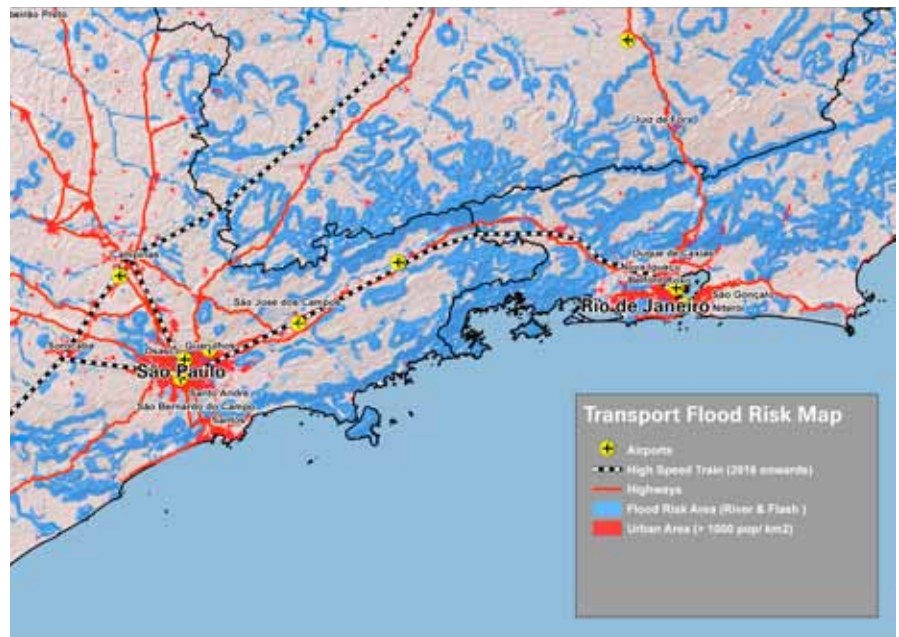
### Swiss Re as a partner in risk prevention and financing

The increasing frequency and severity of major disasters around the world is making risk prevention a top priority, not just for the public and private sectors, but for society as a whole. In Brazil, for example, the infrastructure development and poverty reduction program Programa de Aceleração do Crescimento 2 plans investments in flood risk prevention. Some risks, however, cannot be prevented. In these cases government is expected, at all its levels, to provide rapid emergency relief in order to reduce human suffering and prevent the long-term impacts on socio-economic development. We anticipate that the strain on public budgets continues to rise as a result of the increased risk exposure connected with growing urbanization and intensifying weather conditions.

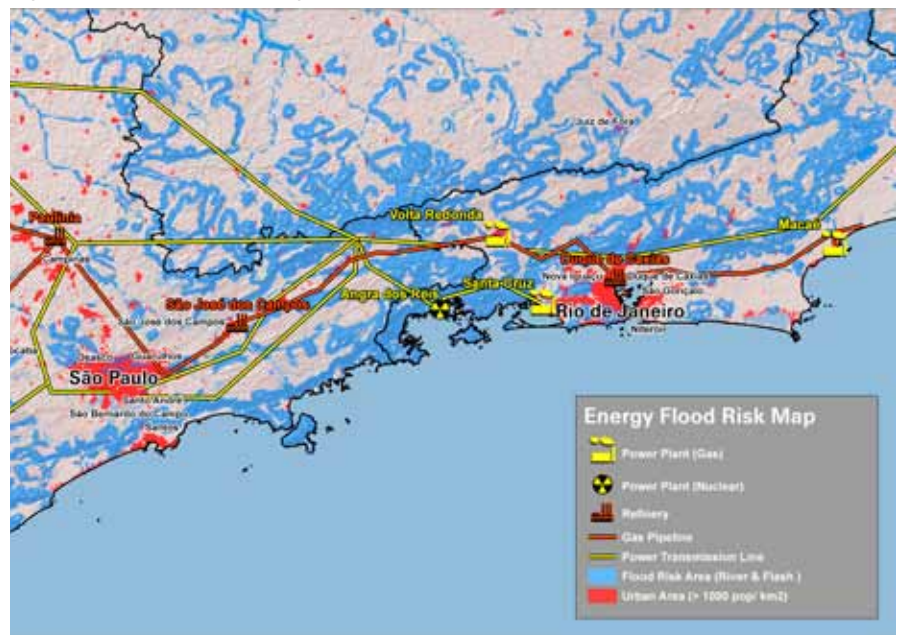
Based on extensive experience in the field of natural catastrophe risk Swiss Re provides thorough risk assessments (eg risk zone mapping in CatNet<sup>3</sup> and in-house modeling) and a comprehensive range of traditional and innovative disaster financing solutions. This includes transferring the financial burden of emergency and reconstruction costs from public budgets and the private sector to the capital markets. An additional benefit of risk financing is the price tag it puts on risks, which contributes to setting incentives for preventive measures, and helps to raise general risk awareness.

As the Brazilian economy expands further, and urbanization continues to mount, the need for effective risk solutions will increase. Swiss Re stands ready to offer risk assessment and financing solutions for reinsurance, large corporations and the public sector.

**Figure 2: Map of critical transportation routes exposed to flood risk in Southeastern Brazil**



**Figure 3: Map of critical energy networks in Southeastern Brazil exposed to flood risk**



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An aerial view of Jardim Botânico neighbourhood in Rio de Janeiro April 6, 2010. The rains which caused floods and landslides, killed about 50 people in Rio de Janeiro state, and shut down transport and commerce in Brazil's second city. The downpour was the worst the city of Rio has recorded in 30 years, according to the authorities.

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