

Scenario analysis

physical risks



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Climate Change physical risk impacts on the real estate sector

Banks can be affected by climate change impacts in different business lines, overlapping opportunities and risks. Among the areas of importance for assessing this type of impact is the real estate sector, which is highly influenced by climatic factors. The Bradesco Organization comprises the second largest Brazilian private bank, the third largest asset manager in the country and the largest insurance company in Latin America. In these three lines of business, we see Bradesco's significant involvement in the real estate sector, mainly in financing construction, property acquisition for individuals and companies, and in offering insurance solutions for properties.

Flood risk as a critical factor for the real estate sector

Climate change affects weather patterns, including rainfall, and can make rains more intense, longer, and high-impact storms more frequent. In urban spaces, the combination of such climatic changes with large areas covered by asphalt pavement and the continuous removal of vegetation can trigger extreme floods. January 2020 was the hottest month since global temperature records began, reaching 1.19°C above pre-industrial levels. In that same period, heavy rains and accompanying landslides and floods affected areas in Southeastern Brazil, such as the Santos region and Greater São Paulo - one of the largest megalopolises in the world, with about 20 million inhabitants. In cities like São Paulo, and many other Brazilian ones, there are buildings in the flood fringe areas, a portion of the floodplain that is expected to be covered with water during rainy seasons. With the intensification of climate change, floods will tend to be more frequent in such areas and to surpass currently mapped limits. In coastal areas—where one quarter of the Brazilian population lives—rising sea levels combined with more intense storms could lead millions of people in the world to leave coastal cities, resulting in impacts for cities in the order of US\$ 1 trillion annually by 2050¹.

Pilot study in Bradesco's portfolio

Considering the relevance of flood risk in Brazil, we developed a study focused on property financing for individuals, i.e. retail mortgage portfolio, which is a relevant segment within Bradesco's total credit portfolio. The analysed portfolio only included properties for which Bradesco also financed construction. This type of financing is particularly interesting for analysis due to the extension of the bank's exposure period, which can reach 33 years considering the construction financing period (from 2 to 3 years), and the purchase financing period, which can last up to 30 years.

Tools employed in the study

We used two tools for this analysis. The current frequency of climatic events was obtained from Swiss Re's CatNet portal, a tool developed to analyze portfolios' exposure to physical risks based on location data and occurrence history. Therefore, it was necessary to use the postal code or geographic coordinates of the financed properties as part of CatNet inputs. For the calculation of future impacts related to climate scenarios, we used the Excel tool developed for the real estate sector in the first phase of the UNEP FI pilot project. In this second phase of the pilot, the tool was complemented with future frequency rates of climatic events in some countries, including Brazil, where it is projected that by the 2040s, flood frequency could rise by 140% compared to the baseline if greenhouse gas emissions follow an evolution curve that would lead to a 4°C global warming context aa (Table 1).

¹ UNEP FI (2019). Changing course – Real Estate. TCFD pilot project report and investor guide to scenario-based climate risk assessment in Real Estate Portfolios. Available from: https://www.unepfi.org/wordpress/wp-content/uploads/2019/11/TCFD-Real-Estate-Web_final_28112019.pdf.

Table 1: Change in flood frequency in the 2040s compared to baseline (4°C scenario)²

Country	Change
Brazil	+140%
Netherlands	+125%
Canada	+80%
China	+40%
United States	+35%
United Kingdom	+30%
Australia	0%

**The 4°C scenario analysis
relied on the RCP8.5 model**

Scenario of change in global average temperature by 2100 compared to pre-industrial

Results of the risk analysis

A minor share of the properties in the analyzed portfolio are located in areas with a current exposure to the occurrence of flooding at an annual probability rate ranging from 0.2% (1 in 500 years) to 2.0% (1 in 50 years). Considering the impacts of the 4°C warming scenario on current weather patterns (Table 1), the future probabilities of flooding were calculated for the 2040s, from which depreciation rates on property values were derived (Table 2). These rates were calculated using an estimated 10% reduction in property value due to extreme events and an average remaining mortgage term of 12 years. Both these values were provided in the Phase I Excel tool.

As a result, in the worst case, for example, flood events which have a 2% (1 in 50 year) annual probability of occurrence in 2020 become more frequent, reaching 4.8% per year (1 in 20 years) in the 2040s. This results in an estimated depreciation of 4.5% in the value of property in the affected areas due to flooding risk compared to the present day. One of the limitations of the study was its focus on areas that are currently exposed to flooding. In other words, the study does not consider new locations that may become exposed to flood hazard due to climate change. In addition, the study did not consider mitigation elements recently implemented by government and by construction companies to manage or mitigate the impacts of flooding on assets. Flood barriers, flood protection walls and buildings above the flood level are some examples of measures that reduce possible impacts.

Table 2: Probability of flooding and resulting property value depreciation compared to present day

Annual probability of flood occurrence		Depreciation
2020	2040s (4°C)	2040s (4°C)
2.0% (1 in 50 years)	4.8% (1 in 20 years)	4.5%
1.0%	2.4%	2.5%
0.5%	1.2%	1.3%
0.2% (1 in 500 years)	0.5%	0.6%

² Data from Acclimatise, derived from outputs of global hydrological model discussed in: Alfieri, L., Bisselink, B., Dottori, F., Naumann, G., de Roo, A., Salamon, P., Wyser, K. and Feyen, L. 2017. Global projections of river flood risk in a warmer world, *Earth's Future*, 5(2), 171-182, doi:10.1002/2016EF000485

Conclusion

The present study demonstrates the relevance of actions to measure and manage climate risks, especially in the real estate sector. In this sense, two perspectives are relevant: the evaluation and management of the total exposure of banks' portfolios to climate risk; as well as the detailed assessment of risk factors and mitigating elements in each property under analysis.

In addition, understanding climate risk factors, and the consequent extent of their impacts, can also be an important tool for banks to expand their ability to support customers in measuring risks and becoming increasingly resilient to climate change impacts. In summary, the growing physical climatic risks and their connection with the real estate sector, demonstrated in the study, reinforce that the application of methodologies, models and tools for measuring and controlling risk in the analysis of operations, customers and portfolios will become increasingly critical in the banking sector given future scenarios of changes in climatic conditions.

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<https://www.unepfi.org/climate-change/tcfd/tcfd-for-banks/>**