



GET FUTURED



CONFIDENCE MOVES THE WORLD

HOW TO ANTICIPATE THE UNPREDICTABLE?

The intensification of extreme weather events is one of the most visible consequences of the climate crisis. Rising temperatures, storms and flooding are now the norm rather than the exception and are characterized by their increased intensity and frequency. Adapting cities and urban infrastructure when these events are still difficult to anticipate in the medium- and long-term is one of the major challenges that lies ahead in the next decade. ●

3 PROOFS IT DOES MATTER

The estimated amount of investment needed to adapt cities to extreme weather events depends on their situation:

San Francisco : \$110 billion

Jakarta : \$42 billion

Amsterdam : \$20 billion

Source: SYSTRA & IAC Partners, July 2023

Global warming is creating unprecedented conditions for "internal climate migration." The World Bank estimates that by 2025, **216 million** people could be forced to leave their homes and move to somewhere else within their country.

Source: Groundswell Report World Bank, 2021

78% of Spanish land is at threat of turning into desert.

Source: Les Echos, April 2024

The city of Nusantara is expected to absorb **1.9 million** people relocating from Jakarta by 2045. ●

Source: Les Echos, April 2024

EXPLORE

TO ANTICIPATE IS TO PLAN

Faced with the constant onslaught of extreme weather, cities and transport infrastructure are our allies from the moment they are no longer designed as working "against nature." Designing resilient transport networks means taking into account the harsh conditions in which the transport system must be able to operate in the future.

Up until now, this job was done on modelling based on previously used models. But this is no longer sufficient. These models must adapt to the unprecedented, anticipating what we have not yet experienced in terms of duration or intensity. No geographical zone is immune to these extreme weather events. Planning means considering the specific geographic reality, climate conditions, economic situations and financing capacity. Cities are developed over the long term. As such, you need to be able to plan how a city is going to evolve and adapt its infrastructure to future risks. Climate risk is not an afterthought to a project. It must be integrated by design throughout its whole life cycle.

Anticipating doesn't mean predicting. And adapting doesn't mean replicating something else. Therefore, we must listen to public officials and the local community who know the unique characteristics of their cities to provide them with appropriate responses. Now is the time for action – coordinated action which much respond to a global threat. ●

THE ENGINEERING INPUT

Many methodological approaches exist to help come up with the right strategy and make the right decisions. Anticipating means relying on a climate risk assessment and climate risk management practices. For transport systems and infrastructure, this means systematically integrating the climate variable into the planning, designing and maintenance phases. This means modelling different scenarios to visualize on several scales how a project functions in its environment.



Mwanza Station – Tanzania

Firstly, this approach is essential in the planning and design phase, as there is an endless trade-off between cost, risks and benefits throughout the project's whole life cycle. After that, the main subject turns to investments:

- How can we make people accept “additional costs” linked to risks that have not yet been thought of?
- How can we make people understand that applying a strategy of resilience is an investment and not an expense?
- How can we demonstrate the importance of adapting infrastructure?

In this phase, engineering must be supported by other levers, such as new construction techniques, like designing structures capable of withstanding very violent winds or using materials adapted to extreme temperatures.

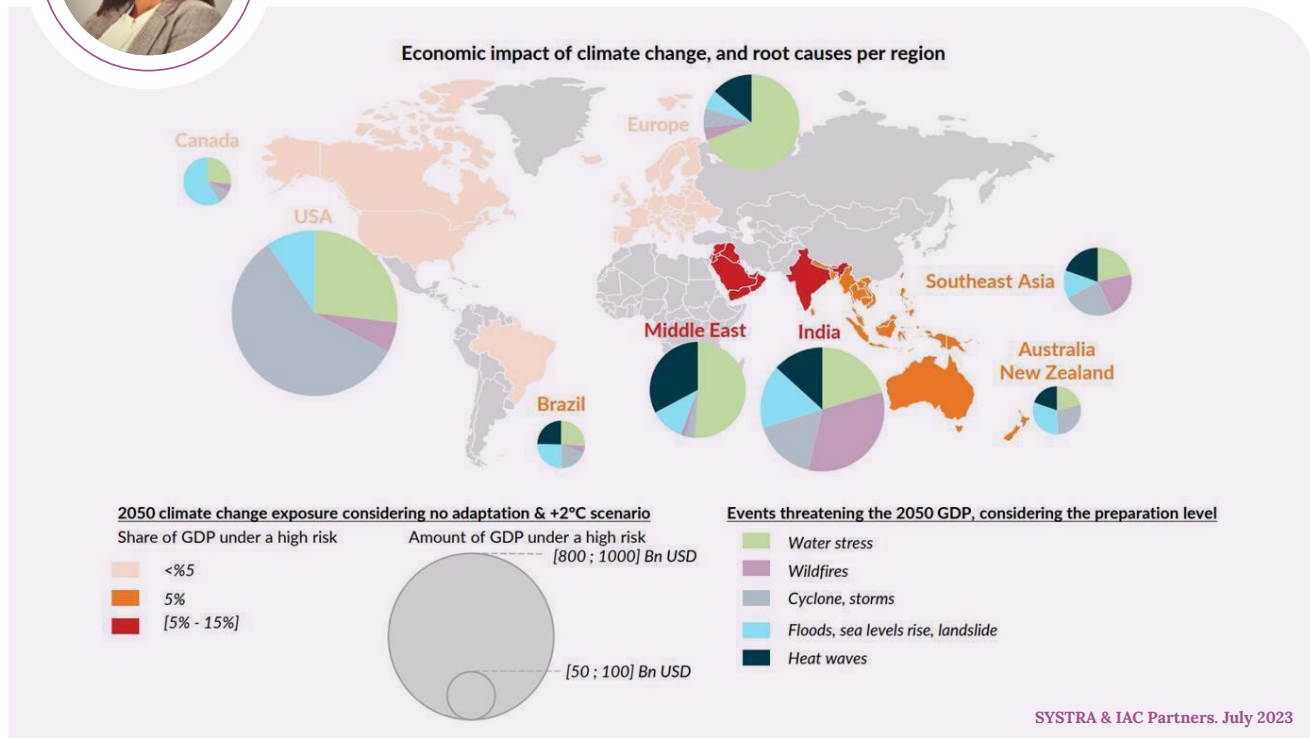
This approach is also indispensable during the operational phase, to guarantee that infrastructure functions properly despite any risks: this stage is based as much on the ability to reduce infrastructure and systems vulnerability, as it is on implementing protective measures, such as building seawalls or relocating certain activities to protected areas.

There is no catastrophic inevitability, nor miracle solution when it comes to climate risk management. Some methods are based on experience and technical knowledge, which must adapt to each unique local situation. This capacity to combine and integrate these factors is vital to creating resilient infrastructures. ●

SEEDS OF CHANGE

- Located near Lake Victoria in Tanzania, **Mwanza station** has been built with bioclimatic design in mind, offering users comfort while also optimizing water resources. The building features large awnings and roof windows which can be opened, simple solutions to combat soaring temperatures without the need for air conditioning.
- **Ouargla tramway** in Algeria's northern Sahara was built to withstand sandstorms that are common in the region. All external components were also designed to withstand extreme temperatures of up to 70°C.
- **Singapore** has transformed 46% of its land into green space, to combat urban heat islands.
- **Hong Kong** has adopted the “sponge city” concept to enhance its flood prevention capacity by increasing the number of “blue-green infrastructures” that collect and retain rainwater. On top of this, the Happy Valley Underground Stormwater Storage Scheme is designed to capture and store water for the city during periods of drought. ●

THE (VERY) SHORT INTERVIEW

Parin Shah Head of Landscape and Sustainability – SYSTRA Dubai

How are you implementing concretely the issue of climate change in your infrastructure projects?

Extreme weather events are increasing in their frequency and intensity. Imagine such events occurring five times a year over the next decade; people will not be able to stay locked up at home for several days, several times a year due to flooding, storms and heat waves. This situation is already impacting the economy, education and transportation. That is why these risks must be integrated from the start at the design phase and environmental planning should lead project management.

Are your clients already aware of the need to shift their mindset?

A huge educational effort is required to explain the importance of fully integrating climate risk into

a project's strategy throughout its whole life cycle. This requires coordination between actors that deliver and operate infrastructures while identifying interdependencies among infrastructure systems. Modelling and scenario forecasting are valuable decision-making tools for project owners. This approach is primarily based on knowledge of the field, geographical specificities, strengths and weaknesses of a territory or infrastructure.

How do you manage to take into account regional specificities in the projects that you implement?

Asia and North America are mostly exposed to floods. For the Middle East, Saudi Arabia and Africa, the main challenge concerns heat waves that can reach temperatures of 45°C (113°F) for several months. Offices, subway stations and shopping centers are all equipped with air

conditioning, but as temperatures rise, so does the demand for energy. It's unsustainable. Fostering nature-based solutions increases infrastructure climate resilience while preserving the ecosystem balance. To adapt, we are designing building principles constructed with hollow walls capable of retaining heat and redistributing it during the night. Furthermore, chronic water shortages make us dependent on water desalination plants. Adapting infrastructures so that they can provide drinking water to a growing population is crucial. We must also take into account rising sea levels, especially in the region of Jeddah in Saudi Arabia, as the population residing near the coast will have to move to a safer place. That's why improving infrastructure and transport network resilience to withstand the effects of global warming is the expected role of every engineering company. ●

INSIGHTS CURATED FOR YOU

[Driving energy transition: a systemic approach for mobility.](#)

[Designing climate-compatible infrastructure.](#)

[Energy transition: public transport leads the way.](#)

[Infrastructure for a Climate-Resilient Future](#)