MANIFESTO

Assisting territorial ***resilience***
and adapting to climate change

setec
Engineers & Citizens

Foreward

"Climate change continues to escalate, reminding us of the urgent need to increase the pace of transition towards strengthening our resilience to health and climate risks.
On a global scale, 2015-2019 were the five warmest years on record; 2019 was the warmest year for surface temperature in Europe, and was marked by two heat waves
and an exceptional drought in France. The first half of 2020 is the warmest ever recorded in France.
It is therefore time to get back on course and to kick-start the transition."

This piece from the Executive Summary of the High Council for the Climate's 2020 annual report reminds us that we will not meet the Paris Agreement's key objectives (reiterated at COP26 in Glasgow) of limiting global warming that is to achieve «well under 2°C» compared to pre-industrial levels, which would make it possible to significantly reduce the impacts.
Climate change is now a reality and the risks to which humans, their activities, resources and natural environments are exposed are increasing inexorably with the rise in temperatures and the disorders of all kinds that this entails.

Crises of varying magnitudes, initially cyclical, with their share of environmental impacts, victims and material damage, and more structural, with potentially even more dramatic consequences, are inevitable throughout the world. Floods, fires: natural disasters are becoming more frequent and intense, with severe impacts on the most exposed populations and vulnerable environments.

These crises are the spectacular manifestations of the changes at hand and they 'reveal', strictly speaking, this continuous transformation of the climate; and it is indeed against this continuous transformation that humanity must fight and adapt, and not only to the consequences of crises.
There is not one single solution to this problem.

It is a combination of actions of various kinds, acting on many factors that must be undertaken now to build a range of solutions adapted to the situation and an analysis of the frequency of events. They range from public mitigation and adaptation policies to deploying protection measures.

Time for action...

As with many issues, this begins with a political, institutional and legal commitment that is more assertive than it is at present, in the sense that it must go beyond the stage of being merely being aware of the situation and into that of taking action. However, such an adjustment would not be enough to prevent the predicted crises, given the significant climate inertia (30 years). In other words, it is imperative to act on two complementary levels.

Firstly, the mitigation or reduction of greenhouse gas (GHG) emissions in order to limit global warming (in other words, to prevent it from getting out of control, which would be irreversible).

Secondly, adaptation to climate change, which means trying to anticipate the short and medium-term consequences of climate change, i.e. the consequences of what has been emitted into the atmosphere in recent decades and which is impacting the current climate, plus what we are currently emitting, which is continuing to aggravate the problem.

Improving the resilience of territories...

Adaptation is an ongoing process, it cannot be enforced. It is defined by the IPCC[1] as «an approach to adjusting to current or expected climatic conditions and their consequences». The first and most natural form of adaptation is to let nature reclaim its rights by modifying or even deconstructing developments that are too restrictive.

From the point of view of the climate issue, this notion of adaptation is often associated to that of resilience, i.e. the capacity of a territory to adapt to climate disruption and to get through extreme events without suffering excessive damage.
Resilience helps to ensure that natural disaster risk management is included in the development plans and related public policies.

Climate hazards have always existed. They are by no means a new phenomenon. However, as a result of human activities, they are increasing in magnitude and frequency as global warming continues, on a time scale never before seen in human history.

They can occur through several types of incidents, each with potentially disastrous consequences at different levels.

These hazards, to varying degrees and with different types of exposure, are causing growing risks to populations, natural environments and resources, transport and energy supply networks, supply

1 https://www.ipcc.ch/site/assets/uploads/2018/02/AR5_WGII_glossary_FR.pdf 2014

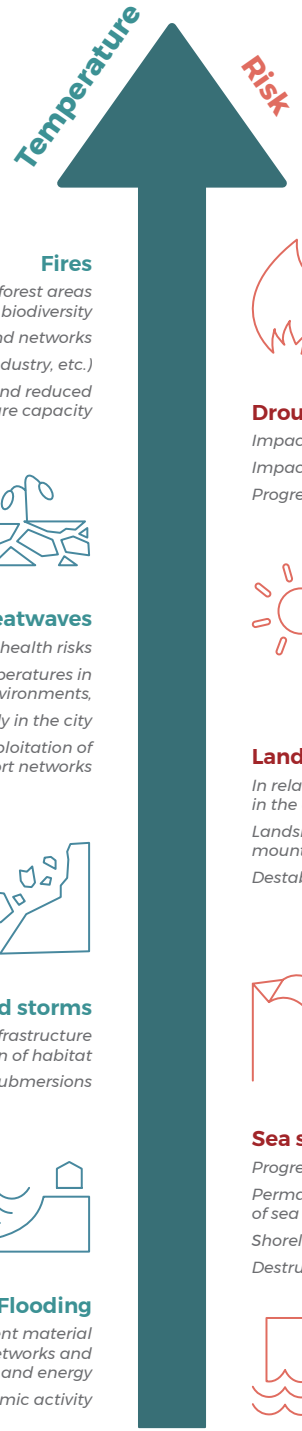
chains, particularly agricultural, etc.
In addition to climate change alone, the concentration of populations in coastal areas or along major rivers, as well as the continuous development of land over the last few decades, has significantly accentuated the problem and increases vulnerability, be it natural, human, material or economic.

In this respect, the beginning of this decade has been representative of what future is ahead, with its share of various crises: exceptional floods in Germany, Belgium and China, uncontrollable fires in Australia, Turkey, Greece, Russia and California, a heat wave in the American north-west, record drought in Madagascar, a cold spell in Texas, etc. Beyond the increasingly dramatic nature of these events, what is striking is their scale and their uncertain occurrence.
In most cases, territories will not be exposed to any of these risks. Their causes are inter-related and complex, and their occurrence often unpredictable.
It is therefore necessary to act now, on a global and systemic scale, in order to limit the damage and to contribute to the emergence of resilient, ecological and supportive urban and rural areas.

Acting at a global level...

As an engineering company, historically rooted in design and construction **setec** must also make a change and initiate a shift that places us more at the heart of these different issues. For example, we can help reduce greenhouse gas emissions by adopting eco-design techniques (see the Low Carbon Design Manifesto) and ensure that we systematically include climate change risks in our interventions. It is easier to write, more complicated to achieve, but it is a commitment in which **setec** wants to fully engage.

It is not a question, as we sometimes hear, of choosing between the proponents of high tech or low tech to contain the crises that are ahead. Our talent is to probably work with both models within their area of interest. They are not necessarily incompatible. On the contrary, it is likely that they will prove complementary in the long run. Our added value will then be to guide the choices as far in advance as possible in order to make the most of them later on down the line, and to offer guidance when applying these measures, their monitoring and evaluation.



Fires

Destruction of forest areas and biodiversity

Impacts on housing and networks

Economic impacts (forestry, timber industry, etc.)

Massive greenhouse gas emissions and reduced capture capacity

Heatwaves

Significant health risks

Sharp rise in day and night temperatures in highly mineralised environments,

especially in the city

Potential consequences on the exploitation of public transport networks

Cyclones and storms

Communications cuts damage to infrastructure and networks significant destruction of habitat

Temporary marine submersions

Flooding

Risks to the safety of people recurrent material damage on urbanisation cutting networks and transport and energy

paralysed economic activity

Droughts

Impact on biodiversity

Impact on water management and conflicts of use

Progressive degradation of agricultural productivity

Landslides

In relation to other climatic hazards, particularly in the case of torrential rain or severe drought

Landslides due to thawing of certain sensitive mountain areas

Destabilisation of buildings and infrastructures

Sea surges

Progressive erosion of the coastline

Permanent submergence due to sea level rise of sea level

Shoreline breaches

Destructive impacts on coastal urbanisation

A genuine but still disorganised awareness-raising process

The urgency to act is no longer debateable, let alone challenged. The difficulty encountered lies in the scale of action to be taken by the stakeholders: climate impacts have no borders but require answers that are both territorial and collective.

In France, the issue is beginning to feature within regulatory documents[1] but there is difficulty reflecting these actions within their territorial implementation. In terms of mitigation and adaptation, public stakeholders are required by law to act within their responsibilities.

The objectives of climate strategies are set within common and interrelated policy contexts[2]. Stakeholders are required to meet objectives that they themselves have defined and to follow-up on the progress of their actions.
At the same time, they must manage and coordinate those involved, all within budgets and funding that are generally not in line with the challenges of their territories and that do not necessarily give them the opportunity to make the right investment decisions today.

At their level, the Public Establishments of Intercommunity Cooperation (PEIC) of more than 20,000 inhabitants, for example, must, since the Law on energy transition for green growth, draw up an inventory of their territory's vulnerability to climate disruption, set objectives for different periods of time and undertake actions within the context of their territorial climate, air and energy strategy. The 'Adaptation' aspect is therefore often the poor relation of these action plans, even though it is generally in this area that local authorities have more room for manoeuvre due to their expertise (land management, infrastructure management, etc.).

Moreover, the upheavals observed are still random. They give rise to an emergency reaction to the cyclical hazard rather than a structural response in the form of large-scale adaptation scenarios.

Public policies to tackle climate change still suffer from the fragmentation of interventions, even though profound and potentially mobilising changes are underway. There is still a lack of tools to evaluate any development project or public policy in terms of its impact on the fight against climate change and GHG emissions. Worse, the complexity of the mechanisms can sometimes lead to options that may seem beneficial at a first glance but will ultimately have negative impacts on GHG emissions.

There is a need to accelerate the deployment of tools for programming adaptation to climate change, strategy, monitoring and evaluation of application.

We consider that there is currently no operational link between the research sector, the State's public institutions (CEREMA, ADEME, etc.) and the local authorities, which are the first to be exposed but are still powerless to deal with the complexity of the issues.

Internationally, we wish to position ourselves alongside governmental organisations and investors, giving priority to countries and geographical areas where we are already present.

In both cases, our service offer is based on technical skills but is initially oriented towards consulting and implementation assistance, before, if necessary, moving on to design.

In addition to the technical aspects of the assignment, environmental and societal dimensions such as environmental assessment, urban planning and consultation should also be included.

The latter is essential to encourage public support for the elements of the diagnosis and the measures recommended for adaptation. Furthermore, it is likely to encourage individual and then collective behavioural change, an essential pillar for preventing the various types of risk and helping to carry out actions.

Increase early detection and awareness of the issues at stake in order to encourage participation,

establish a precise ***diagnosis*** based on a risk analysis in close collaboration with local stakeholders,

build a ***strategy and a prioritised action plan*** to take preventive action, etc.

1 SDAGE (master plan for water development and management), SRADDET (regional plan for land use and sustainable development) or PCAET (Plan Climat Air-Énergie Territorial)

2 Thus, the PCAETs are part of the objectives of the SRADDETs, which themselves respond to the National Low Carbon Strategy (NLCS), which answers to the Paris Agreements, etc.

propose
recommandations

design technical
solutions,

set up a budget and mobilize the necessary public and private **funding**,

propose procedures to accompany the ***realisation*** of actions, their follow-up and evaluation.

setec, a strategic and global approach

Our ambition

To meet these challenges with commitment and determination **setec** intends to mobilise in-house expertise and join forces with specialised partners in certain areas that go beyond traditional fields of intervention (systemic risk analysis, climatology, food, agronomy, etc.).

In addition to work on mitigation, the **setec** Group is convinced that there is an urgent need to adapt all activities (e.g. planning for changes in the resources available at a local level for the renovation of buildings or the exposure of a development to an increased risk of flooding).

Our ambition is to provide public and private stakeholders with a panel of complementary skills, motivated by the subject.

We thus offer our public and private clients assistance in the operational adaptation of specific and non-generic measures to mitigate and adapt to climate change, from strategy to the finality of answers given. We can also provide information and training on the full range of risks and issues facing the territories.

Our strengths

Engineers & Citizens: a purpose

Assuming our role as Engineers and Citizens within the framework of our activities means:

- ***reduce*** the greenhouse gas emissions of the projects we work on, in order to avoid increasing the climate change phenomenon (for example, see the Low Carbon Manifesto[1] of the **setec** Group),

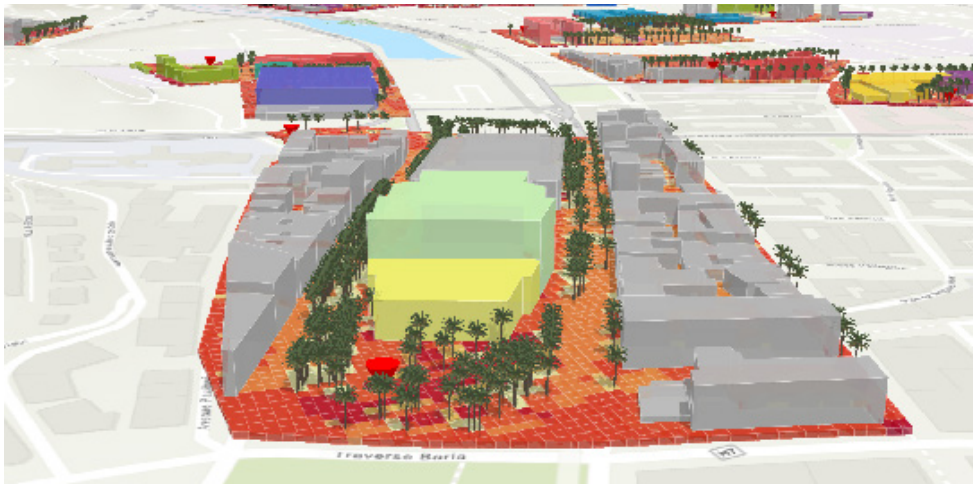
- ***convince*** that there are virtuous answers to a given problem and that their overall socio-economic cost, in relation to the life cycle of the development, is more advantageous for the community.

-***contribute*** to the identification of actions to be taken to consolidate the resilience of territories and the infrastructures that serve them, as well as their progressive application and the evaluation of measures

- ***mobilise*** our skills for projects that contribute to the adaptation of these territories to the challenges of climate change

In addition to our technical expertise in design, we are convinced that our added value as engineers lies in the application of our recommendations and the achievement of objectives through measurable and assessable actions.
In this perspective, eco-design is now an imperative for the group **setec**.

Whenever possible, we take advantage of our position as project management assistant or designer to imagine and propose solutions that do not deteriorate the situation in terms of GHG emissions.



Identification and monitoring of urban heat islands in the Nice Côte d'Azur metropolitan area
setec énergie environnement

1 https://www.setec.fr/LeMag/Manifeste_setec_construction-bas-carbone.pdf

Wateringues territory, Gravelines structure: to evacuate water from the AA to the sea while avoiding marine intrusions
Source : setec hydratec

Our vision as an engineering company

Based on an expert, practical, pragmatic, multidimensional and committed approach, **setec** group's force lies in its ability to deploy a multidisciplinary approach.

We can mobilise a tailor-made team, bringing together specialists (environment, transport, water, energy, infrastructure, etc.) and generalists with an overall vision. Furthermore, we aim to study each territory, each project, each problem with an experienced perspective and without preconceived ideas, in order to avoid ready-made solutions.

Our references

Decision-making tool > Climate assessment of the 2019 budget of the Nice Côte d'Azur Metropolis (France, 2021)

The Nice Côte d'Azur Metropolis has begun the climate assessment of their 2019 budget. On the advice of **setec** the methodology defined by I4CE (Institute for Climate Economics) and a group of partners[1] was applied to the climate change mitigation and adaptation components. The expenses of the entire Metropolis were thus classified according to their potential impact on climate change and their role on resilience in the face of climate change, while the territory is particularly concerned by its consequences. Thanks to **setec**, the Metropolis now has a tool that complies with the I4CE methodology and is adapted to its realities (expenditure, local issues, etc.), which will eventually help to manage investments and operating expenditure with regard to their impact on the climate.

SIG – R&D cooperation mission Identification and monitoring of urban heat islands in the Nice Côte d'Azur metropolitan area

Within the context of a two-year cooperation mission **setec** is using its expertise in GIS and webmapping to help the Nice Côte d'Azur Metropolis characterise, survey and ultimately reduce urban heat islands within the area. The project started with the identification, geographical location and the determination of the intensity of the heat and cold islands (UHIs), of the territory. It continues with the definition of a monitoring allowing the follow-up of the UHIs of the territory and the actions to be implemented to limit their effects. Ultimately, the study will allow the creation of a forecasting, information and training alert system for UHIs.

Medium and long-term risk assessment and strategy to get prepared > Prospective study for adaptation to the foreseeable consequences of climate change in the territory of Wateringues (France, in progress)

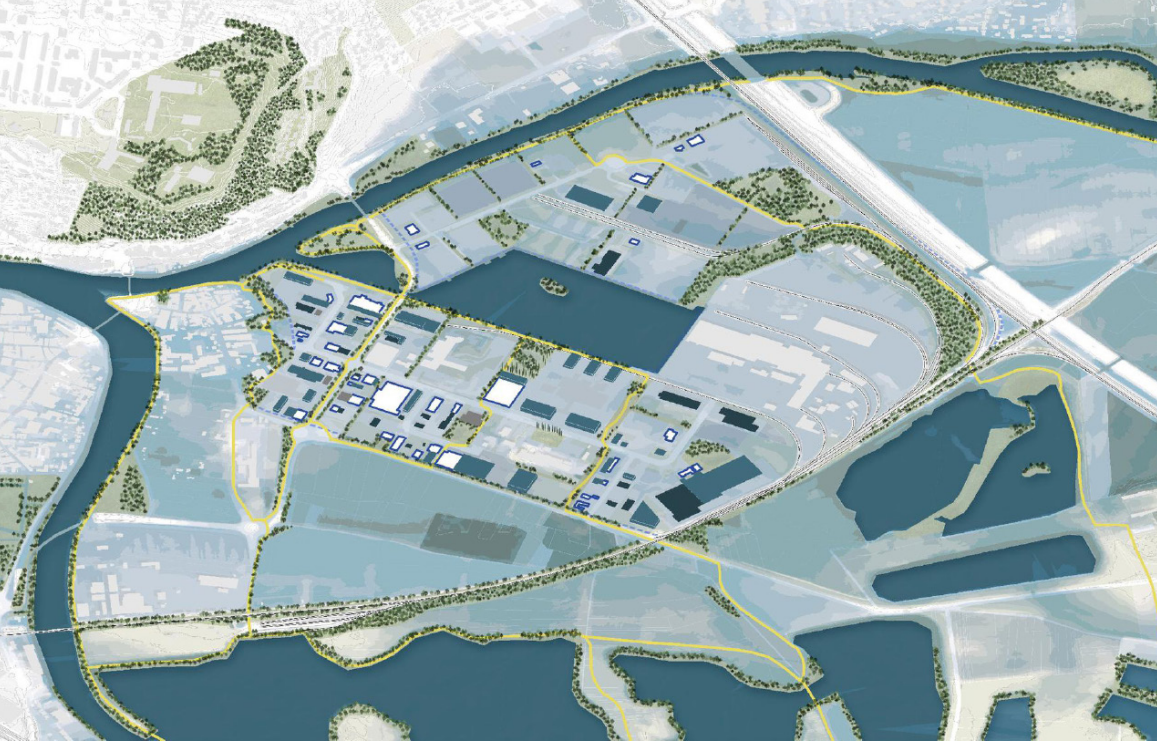
The vulnerability of the river Aa is a major issue in the Hauts-de-France, resulting from the evolution of natural risks and the development of human activities. The risk of flooding is the main issue in this reclaimed, dry area with very low altitudes. In addition to the natural risks, there is the issue of the increasing scarcity of water resources, which could restrict the development or even the maintenance of certain uses in the future.

setec assists local authorities and government departments in defining this vulnerability by highlighting the specific characteristics of the territory and the local challenges to be met, with regard to different climate scenarios. On this basis, a series of possible solutions is studied in order to define a strategy to deal with the situation.

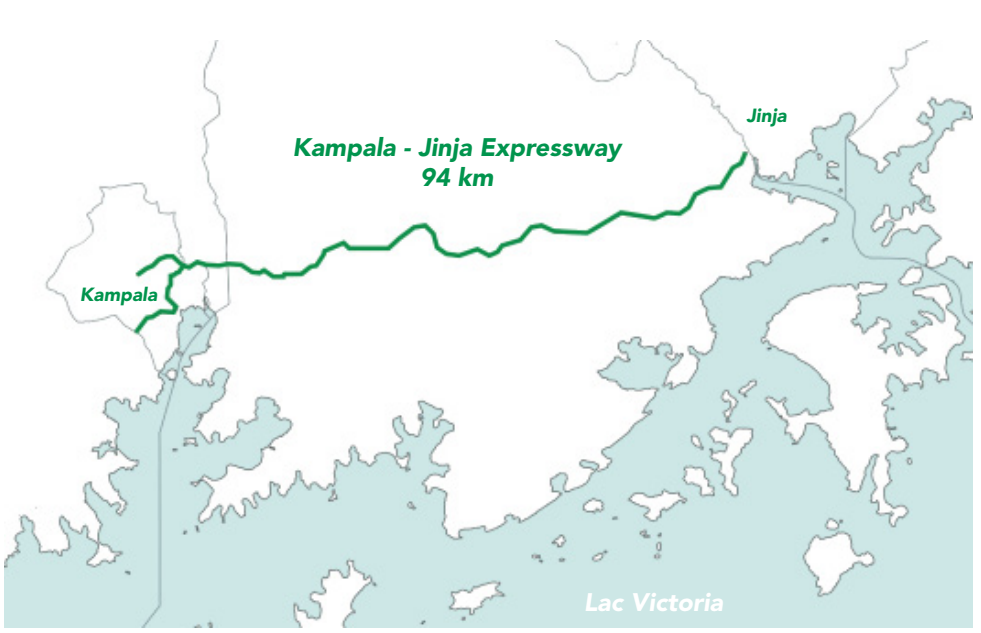
Improving the development of evolving areas exposed to natural risk

The Confluent business park site, located within a flood zone at the convergence of the Yonne and Seine rivers, was selected by the Ministry of Ecological Transition to be the subject of a competition «for a better understanding of natural risks in urban projects». In this context **setec** in association with architects and urban planners, has formulated urban, landscape and architectural proposals that take advantage of the risk as a means of reinvesting the area in a more sustainable and resilient manner.
setec was particularly interested in diagnosing, using tools such as modelling, the dynamics of different types of flooding on site, in order to adapt to the park's development.

1 23 November 2020 : Climate assessment of local authority budgets: summary - https://www.i4ce. org/download/evaluation-climat-des-budgets-collectivites



AMI «Improving the development of territories undergoing change and exposed to natural risks»
Les Marneurs, setec Hydratec, Thomas Bellouin
Source : The Marneurs



The Kampala-Jinja Expressway project, north of Lake Victoria
Source : setec international

Vulnerability of the Solomon Islands road network
Source: setec international

Appointed by the National Agency for Territorial Cohesion, and with the backing of the Territorial Bank, **setec** is involved in engineering projects throughout the territory to adapt to vulnerabilities, particularly those identified in the PPRI. Thus, **setec** is working on the deconstruction of a horticultural wasteland located in a flood zone in the town of Pithiviers, in the Loiret region, in order to restructure the urban space, create a park and re-naturalise the river. **setec** mobilised several expertise, including deconstruction and asbestos removal.

Decision support tool > Assessment of the exposure of the road network to climatic and natural risks (Solomon Islands, ongoing)

Under the guidance of the World Bank and with the support of the Ministry of Infrastructure Development of Solomon Islands, the project aims to carry out an assessment of the exposure of the road network to climate and natural hazards in the Solomon Islands, both historically and under future climate projections. The results of this study will be integrated into the Heritage Management System of the Solomon Islands Transportation System, as a decision-making aid, in particular to direct future renovation and adaptation investments on the most vulnerable and critical road sections for the population, in the event of a natural disaster.

short- medium- and long-term risk assessment and adaptation strategy > Climate Change Risk Assessment on the Kampala Jinja Expressway Project (Uganda, ongoing)

A comprehensive climate change risk assessment is being undertaken on behalf of the French Agency for Development along the project's route, adjacent to northern Lake Victoria in Uganda, from construction, through operation and eventual dismantling of the infrastructure. This approach is carried out in two main stages: a review of all potential climatic hazards, followed by an assessment of the risks that may actually materialise on this project. This assessment includes an analysis of current and future hazards, identification of possible impacts on the project, risk assessment and definition of mitigation or adaptation measures.

Our approach

Information and consultation section

This is an educational aspect that aims to present the origins and consequences of climate change and to share the knowledge acquired (on the scale of the area or infrastructure).

Climate change is a societal, public and political issue. Citizens' expectations in terms of information and participation have been growing for several decades, as disasters and environmental damage increase in material, social and economic terms, etc.

Beyond the legislative context, it is now essential to establish the conditions for citizens and, more broadly, all stakeholders throughout a territory (political, economic and associative actors, etc.) to accept the mitigation and adaptation strategy and measures by adopting an educational approach and calling on the feedback of these stakeholders. The temporality of climate change and the unpredictability of its consequences reinforce the need for clarity in the information that is disseminated, and for precisions in the strategic orientations that are taken.

The **setec** group has the capacity to mobilise an internal expertise to carry out projects so as to define information and participation strategies, and the experience of a network of partners for the realisation of these strategies (specialists in communication, collective intelligence, behavioural sciences or artists, etc.). These skills are part of the technical teams with whom they collaborate on a daily basis. They work together to achieve these projects from the earliest stages right through the entire lifespan.

Diagnostic component

The diagnosis consists of characterising the climate risk at the scale of the territory, the development or the infrastructure and improving the existing knowledge thanks to a multidimensional analysis.

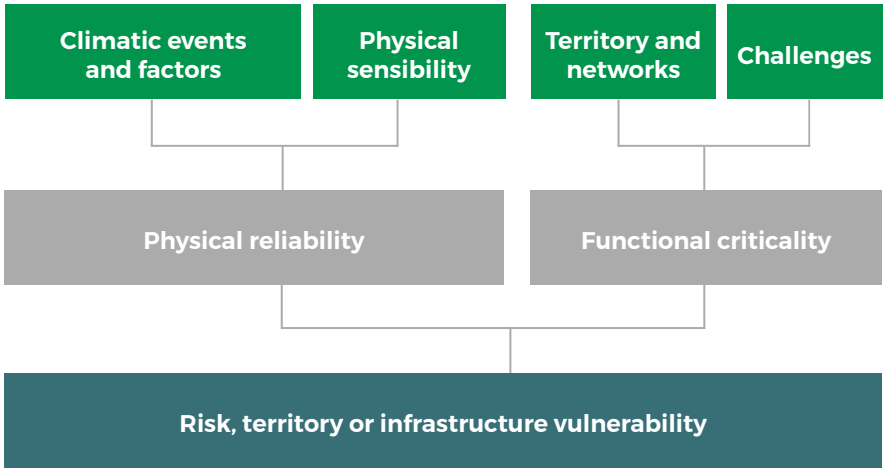
Carrying out a vulnerability assessment is often the first step in an adaptation process. This diagnosis makes it possible to understand how the territory and its development are and will be affected by the consequences of climate change: what impacts actually concern the different sub-systems of the territory and how the different spaces, environments, resources, populations, activities or services will be affected.

It also enables the preparation of an adaptation strategy by prioritising the issues at stake: which risks should be taken into account and which elements of vulnerability should be given priority? These elements are a precious help in identifying, during the analysis of the budget for example, or the construction of the public policy, what are the issues associated with the different actions envisaged, and above all to concentrate on the more structural ones.

This phase must begin with a constructive dialogue with the client according to the scale of the region and/or development, the ambition intended for the diagnosis and the resources available.

Whatever the level of analysis, the different stages are essentially the same:

- characterisation of climatic hazards and the ***level of exposure of the territory***, of the development and of the infrastructure in question,
- characterisation of the ***physical criticality*** of the various subsystems studied, including natural resources and environments,
- characterisation of the ***functional criticality*** of the territory, subsystem or network,
- characterisation of the risk(s) and ***vulnerability*** of the territory and its subsystems.



The establishment of a detailed diagnosis of the vulnerability of a territory or an infrastructure makes it possible to identify the most relevant action points, whether they be mitigation or adaptation measures.

It allows not only to set objectives and guide investment decisions, but also to mobilise stakeholders and understand their respective scope of intervention (regulatory / competences & responsibilities / budget).

Strategy section

The aim is to assist territories towards achieving the desired resilience by building a realistic trajectory based on the initial diagnosis.

This phase can be based on our proven experience in the framework of the Flood Prevention and Action Plans (PAPI): enhancing information, raising awareness, improving forecasts and alerts, developing preventive mitigation or adaptation measures...

setec's teams propose strategies adapted to the political, environmental and societal context, to the issues at stake, to the regulations and to their evolution, and are in line with inter-territorial approaches.

Thanks to our experience in consulting and strategic studies, **setec** is able to assist in the definition and implementation of strategies that include all or part of the areas of climate change (anticipation, risk mitigation, transition, resilience), depending on the objectives sought in the short, medium and long term.

- In the short term, the aim is to create a ***mobilising and motivating dynamic*** through practical, simple and/or necessary actions before going any further;
- for the intermediate term, it is necessary to ensure that the ***various objectives are achieved*** at a satisfactory level, by continuing the momentum, through major actions;
- for the long term, on the basis of known trends and detailed work paths, the conditions must be created for the deployment of an ***anticipatory approach*** so as to make the right choices and adapt to promote this evolution towards a better future.

Each element of this approach includes an objective and a programme of actions to be met. The aim being the relevant regulations and the challenges of the territory, by defining practical solutions for measures to reduce vulnerability in the widest sense of the term and to build resilience.

They lead to the questioning of socio-economic impacts in order to highlight opportunities (local energy loops, circular economy, etc.).

This path aims to organise the gradual transformation of the territory in order to increase its resilience, either through mutation, consolidation or securitisation.

It requires the systematic application of a few essential measures:

- take risk into account in urban planning (floods, landslides or subsidence, fires, etc.),
- reduce the exposure of people and property by proactive action in urban planning regulations and in certain urbanised areas that are too exposed,
- Develop and manage any protective structures required to deal with the identified risks.

Implementation Phase

This aims to accompany the application, monitoring and evaluation of the measures identified in the Strategy section.

This operational phase includes all of the major stages in the life of a project:

- Feasibility studies of the proposed solutions
- Definition of the programme to meet the functional requirements
- Detailed design of solutions to meet these needs
- Realisation of the recommended operations and follow-through of the works
- Commissioning, monitoring and subsequent evaluation of the completed projects

The application of actions is a crucial stage.
It is essential to accompany the stakeholders through this stage of the process, and this is precisely the task of an engineering company like **setec**.

Our multiple technical expertise, at the service of resilience

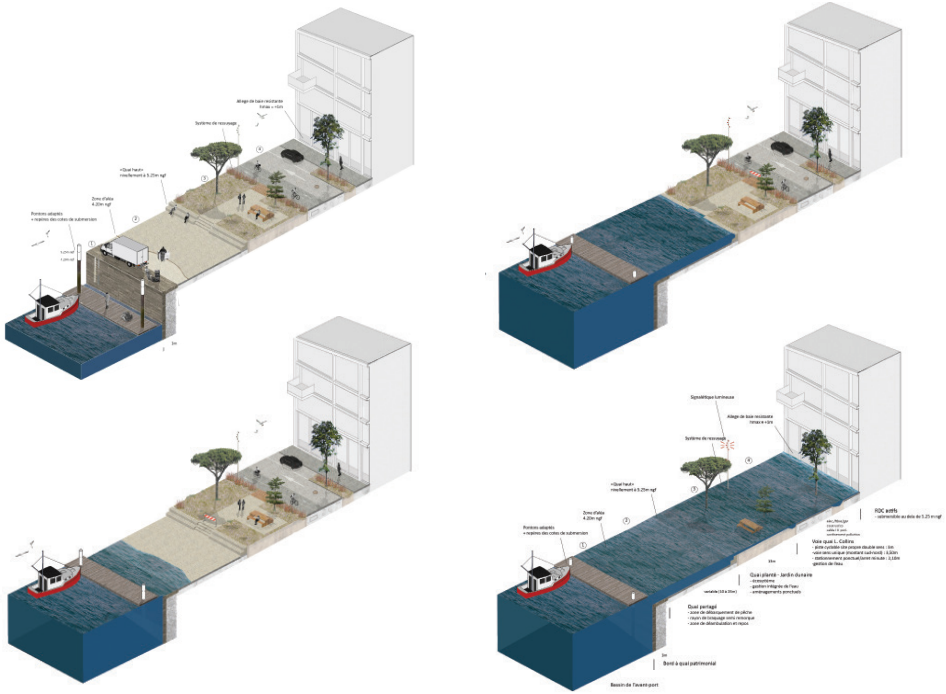
Planning and management

Planning and management of urban strategies

Advice on energy strategy and decarbonation strategy crisis management

Risk management plans

Raising environmental awareness and consultation



Modelling of naturel environments and risks

Geology and hydrogeology

Hydrology, terrestrial hydraulics and coastal hydrodynamics

Oceanography

Atmosphere / Air (wind risk)

Understanding of natural environments - Biodiversity

River and coastal engineering

Terrestrial ecosystems and ecological continuity

Marine and coastal ecosystems

Expertise on infrastructures

Mobility systems engineering works and buildings

River, coastal and port structures

Socio-economic diagnostics

Environmental and regulatory assessment of developments

Legal context and procedural planning

Environmental impact studies

Industrial risk assessment

Integration into the landscape / heritage

Assessing and monitoring environmental impacts

Carbon accounting / carbon balance and BEGES

Life Cycle Assessments (LCA)
Environmental Monitoring

Energy monitoring

Design simply

Ecodesign

Low carbon design

Resilient urban design

Urban heat islands

Ecodesign of urban and rail mobility

Works to fight the effects of climate change

Flood control works

Coastal developments, coastline erosion

Stormwater management

Nature-based solutions

Circular Economy and Recycling

Clean worksites / Green worksites

Deconstruction / Recycling of deconstruction materials and excavated material

Recycling of CO_2 storage of Soil decontamination

Extending the life of existing structures

Extending the life of heritage assets

Rehabilitation of infrastructure

Rehabilitation of buildings

Sustainable and decarbonising energy

Decarbonised mobility

Smart Grids and Energy Flexibility

Low tech and moderation

Geothermal energy, urban heating/cooling networks, Thalassothermal energy

Hydroelectricity and dams

Nuclear

Environmental compensation and rehabilitation

Ecological engineering of coastal and land-based developments

Regeneration of natural environments

Carbon footprint strategy

Capture of CO_2

ENGINEERS & CITIZENS