



## **Changement climatique : clivages théoriques et enjeux pratiques, cas de la Tunisie**

### **Climate change: theoretical divisions and practical issues, Tunisian case**

**Fatma BRAHAM**

Enseignant chercheur

Ecole Supérieure de Commerce de Tunis

Université de La Manouba

Laboratoire ThÉMA

La république Tunisienne

**Fatma.braham@gmail.com**

**Sonia SEGHIR**

Enseignant chercheur

Ecole Supérieures des Etudes Economiques et Commerciales de Tunis

Université El Manar

Laboratoire LARMA

La république Tunisienne

**seghirayadisonia@gmail.com**

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## Résumé

La multiplication, depuis quelques décennies, des crises économiques, financières et de changements climatiques, ainsi que l'évolution de la prise de conscience des impacts environnementaux sur les modèles de développement économique ont favorisé le recours aux théories du développement durable et de la croissance économique de long terme. Face à cette situation mondiale alarmante, les paradigmes du développement durable, des changements climatiques et/ou la transition énergétique ainsi que ceux de la croissance économique deviennent une préoccupation majeure des chercheurs et experts en économie, écologie et autres disciplines. La Tunisie, avec un climat caractérisé par une variabilité prononcée et une grande aridité s'affronte à des choix à faire pour s'adapter à ces impacts et atteindre une résilience. Des choix qui nécessitent une réflexion sur le long terme et une intégration totale aux objectifs du développement durable. En termes d'atténuation : Les nombreuses incertitudes qui pèsent sur la disponibilité et les prix futurs des énergies fossiles, en plus de leur responsabilité dans le réchauffement climatique, amèneront aussi la Tunisie à devoir faire des choix en termes de politique d'atténuation, sans compromettre pour autant ses objectifs de développement. Ce papier de recherche expose en premier lieu, la problématique des clivages théoriques en sciences économiques quant à l'intégration de l'environnement et de l'innovation technologique dans les modèles de croissance dans une optique de long terme. Ensuite, la relation de complémentarité entre la politique environnementale et les innovations technologiques est mise en exergue pour justifier le choix d'une croissance verte. Enfin, le cas tunisien est traité comme un modèle d'une économie vulnérable aux changements climatiques, impliquée dans les accords du développement durable et dont les enjeux de cette implication restent ambigus.

**Mots clés :** changement climatique, croissance verte, politique environnementale, adaptation, résilience

## Abstract

The increasing number of economic, financial and climate change crises in recent decades, as well as the changing awareness of environmental impacts on economic development models, have encouraged the use of theories of sustainable development and long-term economic growth. In the face of this alarming global situation, the paradigms of sustainable development, climate change and/or energy transition, as well as those of economic growth, are becoming a major concern for researchers and experts in economics, ecology and other disciplines. Tunisia, with a climate characterized by pronounced variability and great aridity, faces choices to be made in order to adapt to these impacts and achieve resilience. These Choices require long-term thinking and full integration with the objectives of sustainable development. In terms of mitigation: The many uncertainties surrounding the availability and future prices of fossil fuels, in addition to their responsibility for global warming, will also lead Tunisia to have to make choices in terms of mitigation policy, without compromising its development objectives. This paper first discusses the problem of the theoretical divisions in economics regarding the integration of environmental and technological innovation into growth models from a long-term perspective. Secondly, the complementary relationship between environmental policy and technological innovations is highlighted to justify the choice of green growth. Finally, the case of Tunisia is treated as a model of an economy vulnerable to climate change, involved in sustainable development agreements and whose implications remain ambiguous.

**Keywords:** climate change, green growth, environmental policy, adaptation, resilience

## Introduction

The African continent is one of the hotspots, due to its intrinsic climate characterized by pronounced variability and aridity, coupled with the forcible effects of climate change. These include reduced or variable rainfall, droughts and floods, and the resulting disruption of agricultural systems. Such impacts are exacerbated by loss of infrastructure, reduced hydropower capacity and escalating conflicts due to limited access to natural resources, on which African people are highly dependent for their lives and livelihoods. [Victoria Falls (2015), “Africa, Climate Change and Sustainable Development: What’s at stake in Paris and Beyond”, Fifth Conference on Climate Change and Development in Africa (CCDA-V) 28-30 October 2015, Zimbabwe].

The objective of African economies since the 2015 Paris Agreement is to submit Nationally Determined Contributions (NDCs) and to keep the rise in global average temperature below 2°C. Indeed, if this happens, the African continent is likely to experience a warming of 1 to 3°C. This warming will result in a sharp increase in aridity, particularly in the southern Mediterranean, and a sharp rise in sea level, which will have very negative socio-economic consequences for the region [Mari Luomi (2020) in Global Governance of Climate Change: Seeking Effectiveness and Universality, International Institute for Sustainable Development, December, 2021].

Climate change also has implications for the security of ecosystems. Article 2 of the United Nations Framework Convention on Climate Change aims to limit carbon emissions while supporting sustainable development. Africa’s ability to ensure food and energy security for its citizens is at the heart of sustainable development. For example, a climate governance framework that provides for the conditions for sustainability in Africa must address the issues of agriculture, food processing and distribution, and the reliable supply of clean energy.

Tunisia is one of the most vulnerable countries in the Mediterranean region, particularly in North Africa, with a fairly varied terrain, ranging from the mountainous formations in the north and west of the country, to the steppes in the centre, to the wide plains in the north-east and to the desert in the south of the country.

Admittedly, the revolution of January 2011 upset decision-making mechanisms by imposing new models of governance and providing new opportunities to meet socio-economic demands in terms of employability, regional development and social inclusion, but also revealed a high degree of societal vulnerability, especially environmental vulnerability, in the face of climate

change on the one hand and the problems of pollution and alternative resources on the other part. In addition, political uncertainty as well as the gloomy business climate and the negative impact of the COVID 19 pandemic affected both onshore investment (real sectors including tourism) and off-shore investment, leading to relocation movements, leading to an economic recession (depreciation of the exchange rate, inflation, deterioration of the power of the purchase, etc.) and a rise in poverty and unemployment.

Without significant action, climate change will only deepen the already high levels of poverty and unemployment in the country and could reverse the development gains made in recent decades contributing to food insecurity and political instability. On the other hand, climate change adaptation and mitigation policy choices can create opportunities for economic growth and poverty reduction.

Tunisia, for example, faces major environmental challenges, mainly due to the fragility of its ecosystems – the country being mostly arid, with about 75% of the territory threatened by land degradation – economic activity concentrated on the coastline and agriculture alone consuming nearly 76% of scarce and degradable water resources. As a result, Tunisia is highly exposed to the growing threats of climate change.

Aware of the fragility of its natural resources and the degradation of its biological heritage, the country had long regarded economic and social development and environmental protection as complementary factors in the development process. All international environmental conventions have been ratified and the appropriate legislative, regulatory and institutional frameworks have been put in place and many strategies and action plans have been developed. Nevertheless, despite all the efforts made and the progress made in recent years, Tunisia continues to face significant environmental challenges that undermine its sustainable development and thus the well-being of its people.

At this level, we ask ourselves the following question: What lessons can be drawn from economic models of green growth and how can they be adapted to the Tunisian context? What is the impact of global climate change governance on regional policy (continental or local)? In other words: What economic and environmental policies should be adopted to improve resilience to climate change? What synergies between them and, above all, how should they be translated into strategies and action plans?

The purpose of this article is to provide some answers to these questions. To do so, it is necessary to characterize the current economic, political and social context in Tunisia and to



put forward the main theoretical recommendations for green growth policies. Secondly, it analyses the main studies, strategies, action plans and portfolios of national projects at the level of key sectors in terms of climate change mitigation and adaptation. Finally, our work will address the evaluation of Tunisia's commitment from the point of view of promoting social inclusion and sustainable economic development and, finally, from the point of view of strengthening good governance.

Thus, this research paper aims to provide answers to these questions. To do so, the methodology will be adopted in two sections:

- ✓ Theoretical cleavage of the effects of climate change and the policies to be undertaken
- ✓ Assessment of vulnerability, impacts of climate change and adaptation measures in Tunisia

### **1. Theoretical cleavage of the climate change effects and the policies to be undertaken**

Despite progress in better measuring growth and social progress following the Stiglitz-Sen-Fitoussi report (2011)<sup>1</sup>, the global economic crisis has weakened awareness of the urgent need to act against the degradation of our planet and of the need to prepare the economy of a country or region for a world where the scarcity of natural resources (fossils and minerals) and climate change will be decisive for the growth model. In this perspective, an update of the diagnosis on the priority and the means to be given to the sustainability of growth in the economic strategy for the coming years is inevitable.

Only several divisions and constraints are added to the ecological constraints: economic crisis, health crisis, ideological and political conflicts, depletion of resources, climate change, etc. Hence the following concerns: How to restore the long-term stakes to their place in a crisis situation? How can we overcome the ideological opposition between economic competitiveness and the preservation of the environment? What has been learned about the conditions for implementing sustainable development policies?

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<sup>1</sup> Social Indicators Research An International and Interdisciplinary Journal for Quality-of-Life Measurement ISSN 0303-8300 Volume 102 Number 1 Soc Indic Res (2011)

These are the guiding threads of a set of academic contributions and expertise that we propose the synthesis in this first section. These contributions can be grouped into two themes or questions, on which different insights are proposed:

- ✓ Climate change: long-term issues, theoretical cleavage and alternative approaches
- ✓ Climate change: economic growth, green growth and environmental policies

### **1.1 Climate change: long-term issues, theoretical cleavage and alternative approaches**

In the face of increasing and uncontrolled consumption of natural resources, particularly non-renewable resources, polluting production and climate change, marked above all by global warming, the global economy with its various actors: producers, consumers and the environment are in conflict of interests and perceptions.

There are many attitudes on the part of policy makers, academic researchers, experts and non-governmental organizations, both in terms of the perception of the acuity of the problem and the degree of priority to be given to it, and in terms of the solutions that need to be implemented.

In this regard, the advanced solutions can be listed according to the lever on which they act: conservative solutions see, in the return to the past, a part of the solution; progressive solutions, on the contrary, question the future based on technical progress; the incentive solutions aim to modify the price system under the recommendation of economists; Finally, planning-inspired solutions set standards through regulatory intermediation.

#### **1.1.1 The Conservative/Progressive Divide<sup>2</sup>**

By reducing the production of goods and services, we achieve the goal of reducing the rate of depletion of the planet's resources, which is the central idea of the conservative approach<sup>3</sup>.

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<sup>2</sup>Alain Trannoy, director of studies at EHESS and member of the Economic Council for Sustainable Development (CEDD). This note summarizes an aspect of his contribution to the work of the Circle of economists, Right against Left?, The major issues that will make the presidential election, Fayard (2012)

<sup>3</sup> Practically, apart from transport in a local environment, the two most promising application points for this type of solution are agriculture and food, on the one hand, and the design of urban space, on the other hand. Organic farming, by returning to a large extent to traditional methods, makes it possible to dispense with exhaustible natural resources (chemical fertilizers) and to preserve groundwater.

However, progressive solutions are looking to the future. They give hope in the continuous progress of knowledge and techniques. Conservatives claim its supporters; the current economic machine does not lead to a path of sustainable growth for future generations. But, provided that technical progress is properly guided by a long-term perspective, it is a question of finding energy solutions, in particular much more economical ones.

Progressive and conservative solutions can meet in a rather unexpected way. Indeed, it is possible that some of the technical progress, which has led to savings in natural resources, will lead to a fall in purchasing power and thus to a lower production of goods and services. Indeed, part of technical progress in the past has been to substitute natural resources for work by inventing efficient machines. Capital itself is only a combination of the work of many generations and natural resources. It is equally possible that some of the future technical progress will somehow go the other way, saving natural resources at the expense of labor. If this happens, it will take more hours of work to reach the same standard of living as now and, as a result, without increasing the amount of work provided, the level of production and consumption per head will fall and the decrease will have been achieved by a side road.

### **1.1.2 Incentive solutions**

Incentive solutions are more modest in their purpose, although they can be very effective. They find their basis in the micro economy, which highlights the importance of prices as signals conveying the degree of scarcity of the good or factor of production. Consequently, a microeconomic reading attributes the environmental crisis to the fact that microeconomic agents do not use the right prices of natural resources, waste or even waste.

The overexploitation of natural resources in relation to a sustainable long-term situation results from the failure to take into account the negative external effects in the price of raw materials, energy and renewable resources. Similarly, the excessive emissions of waste and greenhouse gases come from the fact that emission rights markets are either non-existent or do not allow the associated externalities to be internalized. In order for agents to pay the «real» prices of these goods or evils, that is to say, to integrate all the dimensions of their social cost, two technical solutions are possible: either the introduction of Pigouvian taxes<sup>1</sup>; the allocation of rights to pollute that can then be traded on a market. The carbon tax is an example of a Pigouvian tax.

On a distributive level, the solution with rights market leads to results that depend on their allocation, and the Pigouvian solution depends on the use of revenues generated by the tax.



Redistribution is carried out on a flat-rate basis so as not to lose the incentive virtues of the system. For example, the proposed carbon tax has thus failed on the question of the compensation to be granted to low-income households living far from their place of work. Efforts must therefore be made to convince and implement this type of tax reform, but there are no insurmountable economic difficulties in reconciling equity and efficiency in this area.

On the other hand, if we want this Pigouvienne tax to be an important source of revenue for the State, we risk running up against the squaring of the circle (anti-liberal decision-makers not understanding how market creation can correct a market imperfection). For their part, people who are averse to taxes will find it difficult to accept the Pigouvienne tax, even though it is only a question of changing relative prices as the bonus-malus solution perfectly illustrates. Thus, traditional aversions will resurface and print their marks when indicating a preference for either instrument, and we understand why these incentive solutions shake their thinking patterns.

### **1.1.3 Normative solutions**

Instead of acting on prices, to encourage producers and consumers to change their behaviour, we can set standards that have the force of law or at least regulation. Inspiration is very clearly to be found on the planning side, which sets private actors standards to be achieved in terms of production, consumption or processes. This coercive action, which remains dominant, is obviously costly in terms of individual freedom.

But this paternalistic intervention can make it possible to reach the target if the administration has the means to carry out the checks to make the application of the legislation effective. Prescriptive solutions may also have the advantage, if they are announced sufficiently in advance and preceded by a probationary period, of helping to change the preferences of economic agents.

However, normative solutions, when considered without exchanges, have the disadvantage of not minimizing the overall costs of the green transition for society as a whole. This is the great reproach made by micro-economists to this type of solution that of not being economically efficient and causing waste of resources. This economic inefficiency can lead to ecological inefficiency. Knowing that certain agents will have to bear very high costs in order to meet the standards, they can ultimately be placed at a level too low, so as not to put them in too great difficulty.



## **1.2 Climate change: green growth and environmental policies**

Starting in the 1970s, new economic models were developed to analyze how the natural environment could block economic growth. A key parameter in this respect is the greater or lesser substitutability between natural resources and manufactured capital. The more recent models deepen the role of technical progress, and the conditions for its orientation to facilitate the transition to a green economy, and make it possible to identify the transfers to be made, between developed and developing countries.

Both the objective and the means can change. The objective being the growth of a material indicator of wealth should be replaced by the growth of well-being, which is after all the relevant indicator. The means available are reduced to the productive system that can be transformed, to produce the goods we need at a lower environmental cost.

Tackling environmental problems means putting a price on environmental goods through economic policy, while at the same time promoting technical progress to save natural resources – thus returning to the lessons of growth models. The term “green growth” was coined to explain this: actions in favor of the environment are not necessarily punitive, but they can place the economy on a new technological trajectory with great growth prospects. Even if there will obviously be costs to bear in the short term.

The idea of “green growth” is very often associated with the idea of “decarbonizing” the economy. The idea is to replace the production technologies based on the massive use of fossil fuels that have enabled development since the industrial revolution by other forms of energy, renewable and non-polluting.

### **1.2.1 Technology, preferences and economic policies**

Growth theories have long ignored the environment, perceived as inexhaustible and considered a stylized world, in which agents produce with the help of manufactured capital and labor to achieve the satisfaction of the consumption of goods and services.

However, starting in the 1970s, and following oil shocks, economists recognized the need to take account of the natural environment in various aspects in growth models and undertook to study the role of non-renewable resources (fossil fuels, minerals) and renewable in growth. They mainly sought to determine under what circumstances the finite nature of the environment and the scarcity of natural resources constitute a physical limit to growth.

Indeed, the teachings of these founding models are clear. The structure of the economy's growth paths depends, on the one hand, on the characteristics of its technology and, on the

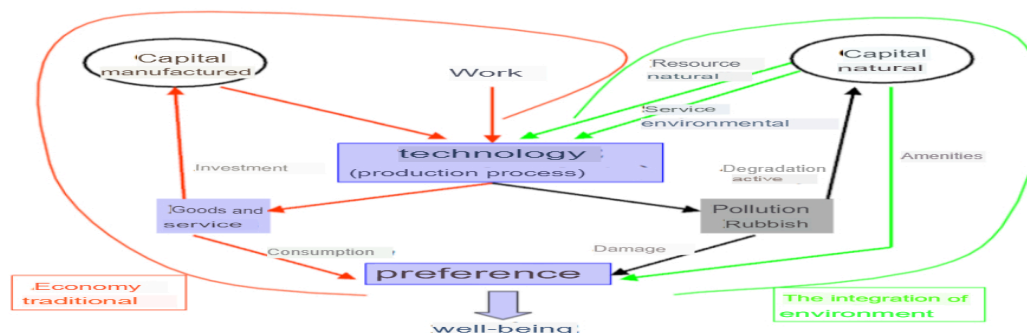
other hand, on the preferences of the agents who populate it. In addition, public intervention is often necessary because natural resources tend to be used inefficiently, their market price not reflecting the full social cost of such use.

In these models, production activity is characterized by its greater or lesser use of natural resources as factors of production (fossil fuels, minerals, but also air, water and renewable resources), and the polluting emissions and waste that it causes. These consumptions of environmental resources and services for productive purposes depend on the characteristics of the technologies used, and in particular on the greater or lesser substitutability between natural resources and the manufactured capital they allow.

If it is easy to replace natural resources with manufactured capital, that is to say if substitutability is great, the depletion of the environment does not necessarily constitute a brake on growth. If, on the contrary, substitutability is limited, the only way to push the physical limit of the availability of environmental resources is to change technology. The preferences of the agents are characterized by their more or less «green» character, reflecting the importance they attach to the environment, and by the discount rate, characterizing their impatience that is-the weight they place on the present in relation to the future.

The extent to which agents are prepared to substitute consumption of goods for environmental quality is central. Like technological data, these behavioral characteristics evolve over time as people become aware of the seriousness of environmental problems and the need to bequeath sufficient resources and a quality environment to future generations (see diagram). Natural resources are often used inefficiently in the productive process because agents rarely pay the cost to society of their use. This is particularly the case when this use is polluting. Economic policy must therefore focus on putting a price on pollution, by means of a tax or an equivalent instrument, which makes it possible to restore productive efficiency and thus promote growth.

**Figure 1 : The integration of natural capital into growth models**



Source: Schubert K. (2012)



### **1.2.2 Growth models and environmental policies: complementary relationship**

In the light of these analyses, it is clear that technical progress and environmental policy are in no way opposable, although they are often presented as such by "technological optimists", who believe that changing technology will solve all the problems and that environmental policy is useless or even harmful. In particular, it does not have the capacity to make the agents who use environmental resources pay the correct social cost of this use. Technical progress and environmental policy are complementary with Innovation, Green Production and Environmental Policies

The most recent growth models, which dissect technical progress in depth, the conditions of its appearance and its direction, go even further. They show that innovation is rarely spontaneous, or rather has no reason to be spontaneously oriented in the desired direction. Historically, since the Industrial Revolution, innovation has overwhelmingly been aimed at saving labor. It has made it possible to equip men with better tools, in the forefront of which are machines powered by fossil fuels. If society wants innovation to move in another direction, i.e. to save natural resources – primarily fossil fuels – and the services provided by the environment, it must adopt an economic policy making it possible to provide researchers with the appropriate incentives. Incidentally, shifting innovation in this direction is good for jobs. Recent literature also shows that there is a phenomenon of historical dependence on the growth path: innovation occurs more easily in the most advanced sectors. However, the sectors that are currently the most advanced are the "polluting" sectors. If society wants the economy to move towards more "green" production, it must once again provide researchers with the right incentives. The earlier these incentives are, the easier the transition to a "green" economy.

Finally, recent growth models emphasize the central role of irreversibility. A modification of the environment, natural or economic, is likewise irreversible if the original situation cannot be restored. Irreversibility can be both environmental and technological. Below these thresholds, the environment is reasonably resilient, and technologies and preferences are characterized by certain substitutability between environment and manufactured goods. If the thresholds are crossed, there is no longer possible substitutability, non-linearity appear, and possibly catastrophic phenomena.

Irreversibility can also be technological: developing a new technology that saves natural resources and adopting it on a large scale is very costly and commits the economy to a new technological trajectory for a very long time. Beyond the common objective, there are differences, depending on the nature of the environmental problems and according to the development of the countries.

Growth models describe a stylized global world, which is sufficient to highlight the links between environment and growth and their consequences, but too aggregated to be able to take into account the specificities of the different environmental problems and the different countries that make up this world. The developed countries have destroyed during their development process a significant part of their primary natural environments, and they have abundantly dented the world's reserves of fossil fuels. Were partially spared ecosystems and natural resources located at very high latitudes, and mineral and energy resources too expensive to extract or out of reach given current technology. In doing so, these countries were able to achieve performance in terms of increasing all the indicators that testify to well-being: satisfaction of basic needs, life expectancy, etc. But they are still powerless in the face of the two major problems of global warming and the erosion of biodiversity.

Developing countries still have primary nature, which harbors the majority of what remains of the world's biodiversity. Here too, the lessons of economic models are clear. On the one hand, it is necessary to promote the transfer of technology so that these countries partially advance, in their development process, the stage based on the massive use of fossil fuels. On the other hand, it is necessary to organize monetary transfers to remunerate the countries that shelter biodiversity, so that they are encouraged to conserve it, and that they have the means to do so.

## **2- Assessment of vulnerability, impacts of climate change and adaptation measures in Africa: Tunisian case**

Africa currently loses \$68 billion a year due to environmental degradation, according to Agriculture for Impact. Additionally, the United Nations Environment Program (UNEP) estimates that key environmental sectors such as forestry, wildlife, fisheries and mining suffer billions in losses from illegal logging, illegal wildlife trade, unaccounted and unregulated fishing, and illegal mining practices.

Without investments to eliminate the inefficiencies in the agricultural value chain resulting from the exploitation of degraded land, Africa loses between 4 and 48 billion dollars worth of food each year in addition to the 6.6 million tons of cereals that it could harvest if the ecosystems were not degraded. More particularly, Tunisia, with a climate characterized by pronounced variability and great aridity, the forcing of climate change should increase the vulnerability of the country both at the socio-economic level and at the environmental level. The rise in temperature and sea level, the drop in precipitation will then affect the availability of resources (water, coastline, agricultural resources, biodiversity) and all sectoral activities (health, agriculture, tourism, etc.). Tunisia will therefore have choices to make to adapt to these impacts, choices that need to be considered in the long term (in terms of development in particular).

In terms of mitigation: The many uncertainties weighing on the future availability and price of fossil fuels, in addition to their responsibility for global warming, will also lead Tunisia to have to make choices in terms of mitigation policy, without jeopardize its development objectives. Aware of these issues, Tunisia ratified the United Nations Framework Convention on Climate Change (UNFCCC) in 1993 and the Kyoto Protocol in 2002.

However, despite the development of ambitious attempts to reduce GHG emissions, Tunisia still needs a long-term implementation of climate policies. It is essential to develop new adaptation strategies in order to limit the harmful socio-economic consequences. This idea leads us to focus, in this section, on the national context by studying the challenges of implementing the Paris Climate Agreement in Tunisia.

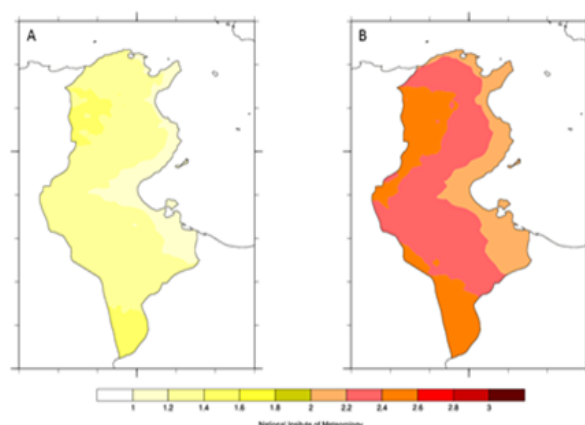
### **2.1. The Tunisian national context: constraints and challenges**

In order to study the challenges facing Tunisia for the implementation of the Paris Agreement on climate, it is essential to dwell on the characteristics of the current national situation which represents a determining factor in the elaboration national action plans.

Tunisia has an irregular climate according to the seasons and arid, which deeply affects water resources and agriculture. Rainfall changes from year to year; seasons of drought or excess rainfall may alternate or follow one another. The North of the country receives more than 400 mm/year, 150 mm/year for the extreme North-West and between 150 and 300 for the center. The situation is more critical in the southern and extreme southern regions of Tunisia which receive, respectively, less than 150 mm/year and about 50 mm/year.

“The projections of average annual temperatures, according to the “RCP 4.5 scenario”, show an increase by 2050 and 2100. This increase varies between 1°C and 1.8°C by 2050 and between 2°C and 3°C at the end of 2100. The coastal borders of the country to the North and East of Tunisia are warming up less quickly than the western fringe and the extreme South. »

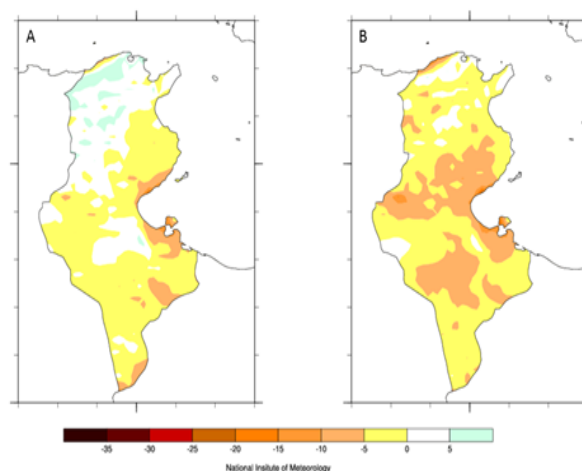
**Figure 2 : Evolution of the annual mean temperature (in °C) by 2050 (A) and by 2100 (B) with the RCP 4.5 scenario**



Source: Ministry of the Environment, Evolution of the climate and climate projections in Tunisia, 2020

Climate projections also reflect a decrease in annual precipitation by the years 2050 and 2100 with a decrease of 5% to 10% for the year 2050, which is accentuated around 2100 with a decrease of 5% to 20% .However, looking ahead to the year 2050, there is a 5% increase in cumulative rainfall in the North-East of the country (Jendouba region), which is frequently exposed to flooding. Inequalities at the spatial level are accentuated by 2100 with low rainfall specifically in the center-west of the country and in the desert zone of Tunisia.

**Figure 3 : Evolution of precipitation (in %) by 2050 (A) and by 2100 (B) with the RCP**



**4.5 scenario**

Source: Ministry of the Environment, Evolution of the climate and climate projections in Tunisia, 2020

## 2.2 The main issues

Given its geographical position in the heart of the Mediterranean basin, one of the regions most exposed to climate change, Tunisia is seriously threatened by the harmful impacts of extreme climatic phenomena. In this context, it is essential to strengthen the mitigation and adaptation measures of key sectors.

Tunisia ratified the Paris Agreement on October 17, 2016. Consequently, it is committed to the development of nationally determined contributions which have enabled it to communicate its mitigation and adaptation efforts. However, the implementation of the Paris Agreement in Tunisia faces many challenges. It is essential to address two key issues, including funding and capacity building.

### 2.2.1 Funding needs

Tunisia has managed to achieve ambitious goals in terms of reducing greenhouse gas emissions, in particular through the implementation of an energy plan. However, much remains to be done in the area of adaptation to the effects of climate change. The country is crossed by major budgetary shortcomings, which increases its financing needs, also taking into account the high costs of energy and ecological transition projects.



**Tableau 1 : Investment financing needs to support the low-carbon scenario of the NDC  
2021-2030 (millions USD 2020)**

Sectors	TOTAL (million USD)	(%)
<b>Energy</b>	11 785	
Energetic efficiency	5 755	40 ,0
Renewable energy	4 377	30,4
Infrastructure (reinforcement of the electrical system)	1 653	11,5
<b>Processes</b>	675	4,7
<b>AFAT(agriculture, forestry and other land use sector)</b>	753	5,2
<b>Waste</b>	1182	
<b>Solid waste</b>	313	2,2
Remediation	869	6,0
<b>TOTAL</b>	<b>14 395</b>	<b>100</b>

Source: CDN updated 2021.

Tunisia has therefore embarked on preparatory processes for access to the Green Climate Fund (GCF) to support the implementation of its climate strategy, in particular through the "Readiness-Tunisia" project implemented place in collaboration between the Ministry of Local Affairs and the Environment and the Sahara and Sahel Observatory.

This project has highlighted the needs in relation to the capacities of accomplishment of climate programs, communication at the national level, real commitment of national and private organizations in the mechanism of accreditation with the GCF.

Access to the Green Climate Fund is through entities accredited by the fund. Currently, no Tunisian institution is accredited. On the other hand, there are progressive discussions to accredit the Fund deposits and Consignment and the Agricultural Investment Promotion Agency. However, with regard to the private sector, in particular the banking sector, the concept of climate finance is not sufficiently generalized since the formulas for access to financing still lack precision.

Access to climate finance is of major importance for Tunisia because it provides the opportunity to benefit from financial resources to support environmental and energy projects

with the aim of embarking on environmentally responsible growth and achieving the targets of the Paris Agreement on reducing emissions and achieving carbon neutrality. For this, it is necessary to encourage entrepreneurs and banks to prepare strategies for green and innovative projects and to benefit from the GCF. Also, the strengthening of corporate social responsibility (CSR) strategies allows the implementation of specific mechanisms at the level of financial institutions to facilitate the development of sustainable financing lines.

### **2.2.2 Capacity building needs**

Capacity building is a key factor in achieving the Paris Climate Agreement targets for climate change mitigation and adaptation. In this context, Tunisia is invited to develop a national capacity-building project that makes it possible to communicate progress in the adaptation framework and share expertise. It is also necessary to target educational and awareness-raising areas.

Moreover, there are two entities responsible for capacity building under the control of the UNFCCC, including the Paris Committee on Capacity Building and the Capacity Building Initiative for Transparency. Tunisia must, therefore, take advantage of the intervention of international experts to achieve its progress. "The total cost to cover the capacity building needs in the field of mitigation has been estimated at around USD 744 million over the period 2021-2030, the largest part of which will be for the energy sector), followed by from that of AFAT."

As part of German cooperation, Tunisia benefited from a capacity building project in 2020 implemented by GIZ in cooperation with the Ministry of the Environment. This project, called "Capacity building and support for the implementation of the national policy for adaptation to climate change in Tunisia "Adapt-CC", has four main objectives:

- The strengthening of the institutional capacities of the Ministry of the Environment with regard to the governance of adaptation to climate change through the support of the Management Unit by objective and the installation of a monitoring committee in order to monitor interministerial and intersectoral cooperation.
- Improving the management of knowledge and information on adaptation through the implementation of an information system which represents a centralized database in order to guarantee the clarity and accessibility of the necessary information.



- Ensuring regular exchanges between the relevant actors at the national level by setting up the national forum of adaptation actors in order to facilitate and improve communication and public/private cooperation.
- Strengthening the actors involved in the implementation of adaptation measures in order to examine the needs for the development of a skills development plan.

The planned implementation of the Paris Agreement in Tunisia has proven decisive for the coherence of Tunisian climate policy and the conservation of resources. In reality, the stakes are considerable, because the debate would gain from greater clarity and the difficulties raised would be more easily overcome, as if efforts were made to increase knowledge of the purpose and the implementation of the Agreement of Paris, the objectives would obviously be achieved at the national level.

## Conclusion

The climate challenge is international in nature and to meet it, it is necessary to make the State a central actor in the formulation and implementation of adaptation measures. The global architecture for managing the climate response, including financing for climate change adaptation and mitigation, creates a complex web of multilateral and bilateral requirements that depend on effective action by a state, empowered and equipped with appropriate national and sub-national institutions, to function well.

The development of adaptation and mitigation policies and strategies is therefore strongly dominated by central government actors. Civil society organizations and local communities have so far contributed little to the formulation of national climate change adaptation policies and strategies.

However, overall, the state and state institutions in Africa have weak capacities and face major challenges that hinder the formulation of innovative mitigation and adaptation measures. The reconstitution of the African state through structural adjustment programs has meant that for many years the state has been gradually withdrawing, even from the activities of providing social services, through the privatization of many services such as education, forestry, waterworks and sewage systems, energy production and supply, transport (including the construction and maintenance of road, rail and maritime transport infrastructure) and the agriculture. They all turn out to be key sectors for adaptation to climate change. Public

institutions face significant challenges in developing and implementing adaptation policies and strategies in these and other sectors.

In the case of Tunisia, all the pillars of Tunisia's food security are likely to be shaken by the impacts of climate change by 2050 to 2100. The Center and the South of Tunisia, already located in the Saharan zone and conditions present increased risks for olive trees, cereals and rangelands with varying degrees of exposure: high for olive growing in the central East and West regions, lower for cereals whose surfaces are reduced in these regions. Northern Tunisia presents increased risks for cereals due to its high exposure. With regard to fishing, although the increase in sea surface temperatures has negative effects on endemic species, it promotes the accelerated invasion of exotic species, with positive consequences on the productivity of the marine environment, if however the phenomena of pollution, illegal fishing and overexploitation do not worsen in the coming decades.

With a long experience of development planning and an ambitious environmental policy, Tunisia today has many advantages for the establishment of an SNCC: structured institutional framework diversified legislative and regulatory system. If the latter will necessarily have to be adapted and strengthened in the perspective of climate change, but they nevertheless constitute essential starting points. The SNCC should also be a unique opportunity for Tunisia to implement a participatory and decentralized approach and confirm the break with the past model (authoritarian and centralized).

However, despite this manifest political will, it often appears that it is the orientations of the socio-economic development policy that take precedence and guide land use planning in Tunisia and not the reverse. Thus, under the pressure of socio-economic development requirements, there is often a decoupling between spatial planning and socio-economic planning leading to a significant regional imbalance. This is partly explained by a certain rigidity observed at the level of regional planning instruments, sometimes leading to their rapid abandonment under the pressure of the demands of the speed of implementation of investment programs and projects. Moreover, the dominance of the sectoral vision does not often make it possible to resolve the major issues and problems of land use planning such as the country's coastline (tourism, industrialization, etc.), the sprawl of urban areas and the degradation soils and natural ecosystems.

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