

Morocco's experience in loss and damage management: the case of oases

Submission by Morocco's Ministry of Energy Transition and Sustainable Development, with input from ANDZOA (the National Agency for the Development of Oases and Argan Zones)

Overview

This submission by Morocco to the Transition Committee focuses specifically on the perspective of oases communities in Morocco as frontline communities in the climate crisis, and builds on previous engagements by Morocco with this process, including a submission regarding macro-level national loss and damages from drought and decreases in precipitation. The establishment of a fund to help compensate for loss and damage caused by climate change at COP27 is encouraging news for the highly vulnerable oases communities of Morocco, which have suffered extreme events that have had considerable repercussions. The oases of Tafilalet, which have played a key role in the nation's history, are a prime example of the loss and damage caused by the consequences of climate change. Periods of drought, water scarcity, floods and fires have become commonplace in the oases, with devastating consequences for local communities and the land, as well as on tangible and intangible heritage. Given the gaps in adaptation and resilience, the establishment of the global loss and damage fund offers an opportunity to support national financing measures aimed at coping with loss and damage in oasis frontline communities, in Morocco and beyond, especially in similar oasis regions of other Arab and African countries.

Note: Morocco aligns its position with the developing countries' proposal to the Transitional Committee: The Loss and Damage Fund must serve as the cornerstone of the broader international loss and damage finance structure. Funding should be primarily provided by developed countries, but voluntary financial contributions from other parties are encouraged. Administrative and financial procedures of the Fund should be simple, clear, and efficient, minimizing bureaucratic barriers and ensuring accessibility, particularly for countries with limited data or capacity. The Fund should primarily rely on grant-based public financing, aiming to reach at least \$100 billion annually by 2030, with the possibility of scaling up as needed. The constitution of the Loss and Damage Fund Board should ensure equitable and geographically balanced representation from all Parties, fostering transparency, inclusivity, and efficiency.

Introduction

The oases of Morocco are located in arid areas where rainfall barely exceeds 200 mm/year. The oasis area is home to 2.2 million inhabitants, or almost 6% of the country's population, over a surface area of 208,673 km² (ANDZOA, 2022). Oases serve as an ecological barrier against desertification, and their protective effect extends to the northern shores of the Mediterranean. They also harbor a variety of natural resources and cultivated crops (dates, olives, cereals, etc.).

Oasis agriculture is an irrigated form of agriculture, relying heavily on access to water. The cultivation system is organized around the date palm, which protects the soil and crops from the sun, forming the backbone of the oasis ecosystem and the main source of income for the communities.

The effects of climate change are particularly visible and felt acutely throughout the oasis zones. The oases are exposed to medium to high levels of drought, and face multiple climate risks, in particular drought, floods and fires. These extreme phenomena have never been so frequent as today. Trends in extreme events are rising temperatures, falling precipitation, fewer wet days and more dry days per year. Precipitation periods have shifted, and flowering has been brought forward by more than 40 days. One of the temperature scenarios for the year 2100 indicates that in the south-eastern regions of the Atlas Mountains, temperature rises of between 5 and 7°C will occur (ANDZOA, 2022¹).

According to a study by the Department of the Environment, entitled "Adapting to climate change for resilient oases", Morocco's future climate projections, carried out as part of the Second National

¹ Strategic and territorial diagnosis, development strategy for oasis and argan zones up to 2030

Communication on Climate Change, predict an average drop in rainfall of -13% and -19% in 2045 and 2075 respectively. Another study carried out in Ouarzazate on projected winter rainfall accumulations for the period 2030-2050 showed a decrease in precipitation over the entire oasis zone (UNDP, 2011), which could reach -35% in Ouarzazate over this period, relative to the period 1971-2000.

Such disturbance to the climate will accentuate extreme events such as drought, floods and fires. Morocco's oases have suffered losses amounting to 40% of their cultivated area (Programme Oasis résiliente, 2009). The gradual disappearance of conditions conducive to sustainable agriculture in the oases has led to a decline in the population's income, which presents serious problems for a large proportion of the population living in the oases and deriving their income from agricultural activities. The creation, at COP27 in Sharm-Sheikh, of a Fund to support countries affected by climate-related disasters is an essential element in the fight against loss and damage caused by climate-related events, including in oases. This Fund should complement and be complemented by actions at national level to tackle the root causes of the problem and promote sustainable solutions.

I. Climate losses and damage

- **Losses related to drought risk**

Climate projections show that the agricultural water deficit in oasis zones will increase, and irrigation water requirements will vary in the same direction. Agricultural water requirements, for example, are expected to increase by 2% over the period 2020-2050 for Zagora province and by 8% for Ouarzazate province (Heinrich Böll, 2017²).

The recent prospective study of the impact of climate change on agricultural yields in Morocco by the end of the 21st century confirms future climate projections for Morocco and indicates that aridity will progressively increase due to decreasing rainfall and rising temperatures, with negative repercussions on agricultural yields, especially from 2030 onwards, and that rainfed (non-irrigated) crops will be particularly affected by climate change.

Climate change will, in fact, result in yield reductions of the order of 10 to 15% for all oasis provinces (CC Adaptation Initiative in Oases 2017).

The prolonged drought of the 1980s in Morocco led to the partial desiccation of over 500,000 date palms, with production levels ranging from 12,000 tonnes in the extremely dry year of 1984 to 120,000 tonnes in the particularly wet year of 1990 (Haddouch, 1996). This case shows how production declines with increasing duration of drought. Secondly, the aridity of the climate is an aggravating factor in desertification, which results in soil degradation and the disappearance of vegetation due to prolonged drought.

Indeed, this lack of water affects a large part of farmers' income and destabilizes the population, encouraging migration to neighboring regions, towns or other countries.

- **Losses related to the risk of palm fires**

Summer heat, which has become increasingly extreme, is having repercussions on the outbreak of fires in various oases, affecting thousands of date palms.

In the Cercle d'Errachidia, for example, date palm losses totaled 2,485 between 2008 and 2010.

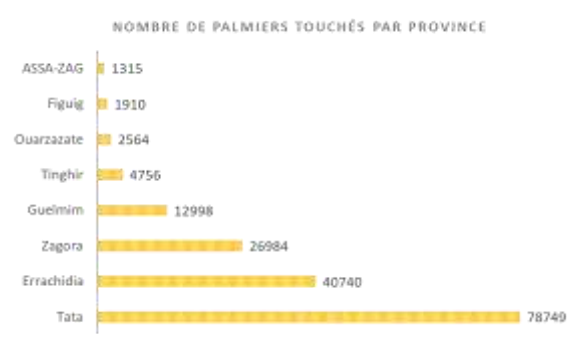
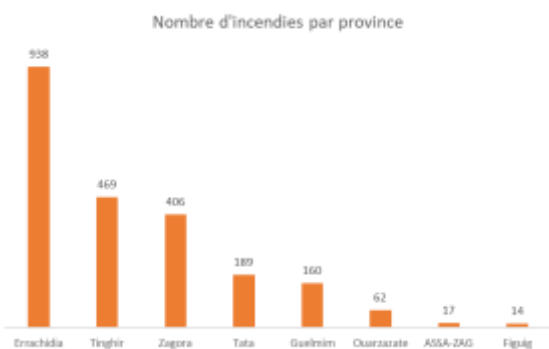
	Number of burnt palm trees	Number of cases of fires	Cercle
2008-2010	634	27	Cercle of Erfoud
	948	34	Cercle of Rissani
	857	14	Cercle of Goulmima
	46	14	Errachidia province

Source: Resilient Oasis program, 2009

² Study on "Women in the Oases and Climate Change", Heinrich Böll Fondation, 2017

Fires in the Aoufous commune in 2019 destroyed more than 2,540 palm trees and 1,500 olive trees. In August 2021, around 5,500 palm trees were destroyed in the same commune, during a fire that affected an area of around 40 hectares, as well as the loss of around 200 trees, including 100 olive trees (ANDZOA, 2021).

Each fire attacks an average of 0.6 ha and affects an average of 75 date palms. Nevertheless, these statistics do not reflect the degree of danger a fire can cause, especially if intervention is delayed. For example, 35,905 date palms were burnt in the province of Tata in 2018 as a result of 30 fires, giving an average of 1,197 palms burnt per fire (well above the average), bearing in mind that 19,500 palms were affected by a single fire in the Aguerd oasis on 09/07/2018 over an area of 65 ha, not to mention the damage caused to infrastructure and the resources mobilized to extinguish the fire.



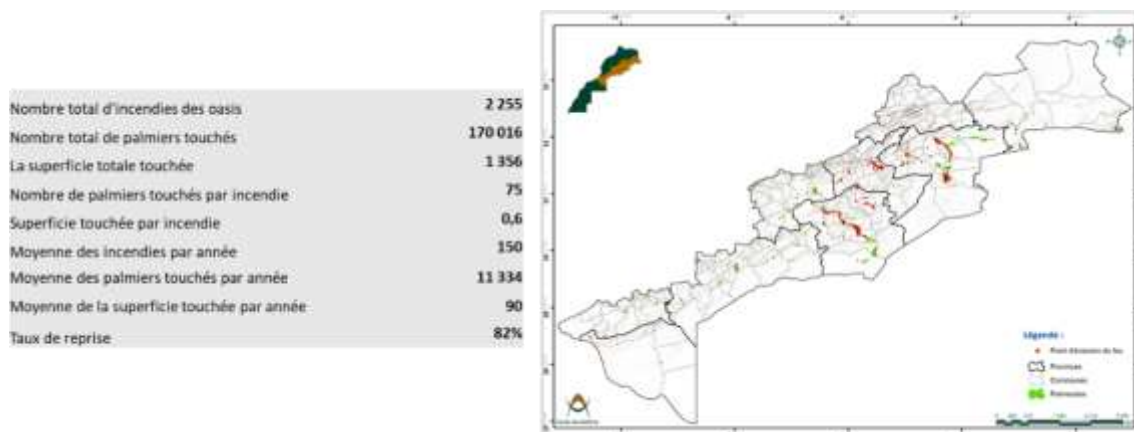
Source: ANDZOA, 2023

The largest fires recorded between 2009 and 2023 are shown in the following table:

Province	Oasis	Date de déclenchement	Superficie touchée en Ha	Nombre de palmiers touchés
Errachidia	Ksar Jdid (Aoufous)	22/08/2021	40	5 500
Zagora	Mezquita	14/07/2021	45	6 000
Tata	Aguerd	09/07/2018	65	19 500
	Adis	23/07/2023	31	9 000
Guelmim	Asrir	25/03/2019	94	8 260

Source: ANDZOA, 2023

The map below shows the spatial distribution of fire hotspots in the oasis zones:



Source: ANDZOA, 2023

- **Losses due to flooding**

Over the last two decades, Morocco has also seen an increasing frequency of meteorological phenomena with a high risk of flooding. Torrential rainfall and flooding caused enormous damage in the province of Errachidia in August 2006 (Merzougua region), in the east in May 2007 and more recently in October 2008 again in the province of Errachidia (Gourrama and Boudnib regions) and in the north of the country. (Tanger, Tétouan, Nador, ...)³.

The oasis basins of southern Morocco are located close to the wadis to facilitate the use of surface water. This proximity to wadi beds, important for water mobilization, means that these areas are exposed to the risk of flooding.

The Guelmim basin, for example, recorded exceptional rainfall of 260 mm in 2014. These intense, torrential rains generated devastating, destructive floods and caused major damage to housing, roads, drinking water supply, electricity and sanitation networks, and to other public goods and services. The number of deaths was around 27 (Atbir, 2014).



II. Government interventions to manage climate-related losses:

- **For fire-related risk**

It should be noted that several measures have been undertaken by the relevant parties in partnership with the provincial palm grove firefighting committees since 2019 to counteract this phenomenon. Indeed, initiatives aim to increase the effectiveness of interventions aimed at protecting oases, fighting

³ Formulation study for the project to adapt to climate change in oasis zones (PCCZO) financed by the Adaptation Fund, 2014.

fires at oasis level and raising awareness of the dangers of this scourge, with 3 major regional agreements established in Draa Tafilalet, Guelmim Oued Noun and Souss Massa:

- For the Draa Tafilalet oases, a partnership agreement for fire protection, preparation and rehabilitation of the Draa-Tafilalet oases has been set up. The total cost of the project is estimated at approximately 54,519,850 USD.
- For the Guelmim-Oued Noun region, a partnership agreement has been approved for the development of oasis areas and the fight against the recurring danger of fires, at a cost of 12,700,000 USD.
- For the Souss Massa region, and in particular the Tata oases, a partnership agreement worth 11,226,500 USD has been drawn up with the provincial council for fire protection.

The national agency, ANDZOA, has undertaken a number of actions to contribute to the fight against oasis fires. With this in mind, and given the number of fires reported in recent years in national palm groves, an initial analysis of data and monitoring and prevention devices, of the device to combat palm grove fires has been initiated since 2017. Indeed, it has initiated the study, examination and treatment of this phenomenon through the collection and processing of available information, the implementation of awareness-raising actions and consultation workshops as well as strengthening the effectiveness of intervention.

ANDZOA has set up a geographical information system to monitor and track oasis fires, based on actual data collected from the following sources. Examination of the data collected confirms that fires in Moroccan palm groves can occur in any month. Fires have been recorded in January and December, but most fires occur between February and August.

- **For drought-related risk**

In 2020, the Moroccan government set up an emergency rainfall deficit impact reduction program (PRIDP), with a budget of \$1 billion (equivalent to 10 billion MAD), to provide the necessary assistance to farmers and livestock breeders, and to cope with the impacts of late rains on the various sectors of the agricultural sector.

The first component of Axis 1 of the program in question, relating to the protection of animal capital, was implemented in the Draa-Tafilalet oases at a total cost of 17 million USD.

Similarly, the development strategy for the oasis and argan zones has provided for the implementation of four additional water resource mobilization programs: the large dam construction program, the medium and small dam construction program, the groundwater mobilization program and the non-conventional water mobilization program.

The implementation of the two programs relating to dam construction has contributed to a clear improvement in surface water storage capacity in the area of action of the various hydraulic basin agencies (ABH) in the oasis zones, namely:

<i>ABH</i>	<i>Overall capacity of dam impoundments</i>	<i>Volume of reservoirs built</i>
Guir Ziz - Rhrès	1.351 billion m3 of which 1.114 Mm3 under construction	236,693 Mm3
Draa Oued Noun	679.613 Mm3 of which 397.31 Mm3 under construction	282,303 Mm3
Moulouya	90,80 Mm3	

In 2021, the Department of Agriculture continues to encourage the use of water-saving techniques. The surface area of farms (new or reconverted) equipped with drip irrigation is 11,770 Hectares, and the volume of water saved is estimated at 38 million m3.

- **Challenges and gaps exacerbating loss and damage:**

Despite government efforts to improve loss and damage management in the oases, there may still be gaps:

- In terms of early warning systems, compared with the rest of the Kingdom, the oasis zones are deficient in terms of coverage by monitoring equipment such as radars or weather stations, remote sensing satellite image processing, fire lookouts or automatic hydrometric and piezometric stations, as well as in terms of the distribution of response resources and manpower.
- In terms of climate multi-risk insurance, oasis communities lack economic protection systems against losses caused by natural disasters. To be affordable in the context of increasing climate-related risks, Morocco has experience with non-profit insurance schemes which are subsidized by public grant-based resources. Such systems can help to compensate the victims of such events, reducing the disastrous financial consequences for affected households and farmers.

III. Existing measures requiring greater funding to help cope with loss and damage in the oases

- National Vehicles, Channels and Mechanisms

The situation outlined above highlights the critical importance of funding needs for oases, to contain and address loss and damage caused by drought and fire. Given that Morocco is a country vulnerable to the effects of climate change, the government aims to draw upon the new loss and damage fund to endow the following vehicles, channels, mechanisms for coping with loss and damage, for routing loss and damage finance:

- **Humanitarian aid and emergency state-led relief and assistance** are essential to meet the immediate needs of affected or displaced families, including food, shelter, care and compensation.
- **Subsidized non-profit catastrophe risk insurance programs** can also be set up to cover losses and damage suffered by farmers affected by water shortages and fires.
- **Social protection:** one policy approach to help communities cope with the growing losses posed by climate change in the long term is the development of progressive national social protection systems, helping to create a social safety net for vulnerable citizens.
- **Emergency state relief efforts:** this is funding provided to individuals, businesses or organizations in response to unexpected events or circumstances that require immediate financial assistance.