



مؤسسة الأطلس الكبير
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High Atlas Foundation

Earthquake in Al Haouz Province
Project to rehabilitate agricultural infrastructure in the medium and high
valleys north of Toubkal National Park



I/ Context:

The 2023 earthquake in Morocco, which occurred on September 8 at 11:11:0.6 p.m., with magnitude MW = 6.8, is the largest in the country's modern history. Its epicenter is located in the High Atlas 71.8 km southwest of Marrakech, in the rural commune of Ighil, Al Haouz province, Marrakech-Safi region, and its hypocenter at a depth of 12 to 24 km depending on the scientific institutes.

According to a report published on September 14, the earthquake left more than 2,900 dead and 5,500 injured in the provinces of Al Haouz, Taroudant, Azilal, Ouarzazate and Chichaoua. The tremors caused significant damage and the collapse of several buildings, and were felt in several regions of Morocco. This unexpected disaster requires the combined efforts of all efforts to support the victims and help them return to their normal lives.

To this end, administrations, NDGs, international organizations and others are invited to help rebuild damaged infrastructure, assist families who have lost their homes and rehabilitate agricultural infrastructure which constitutes the basis of their daily activities.

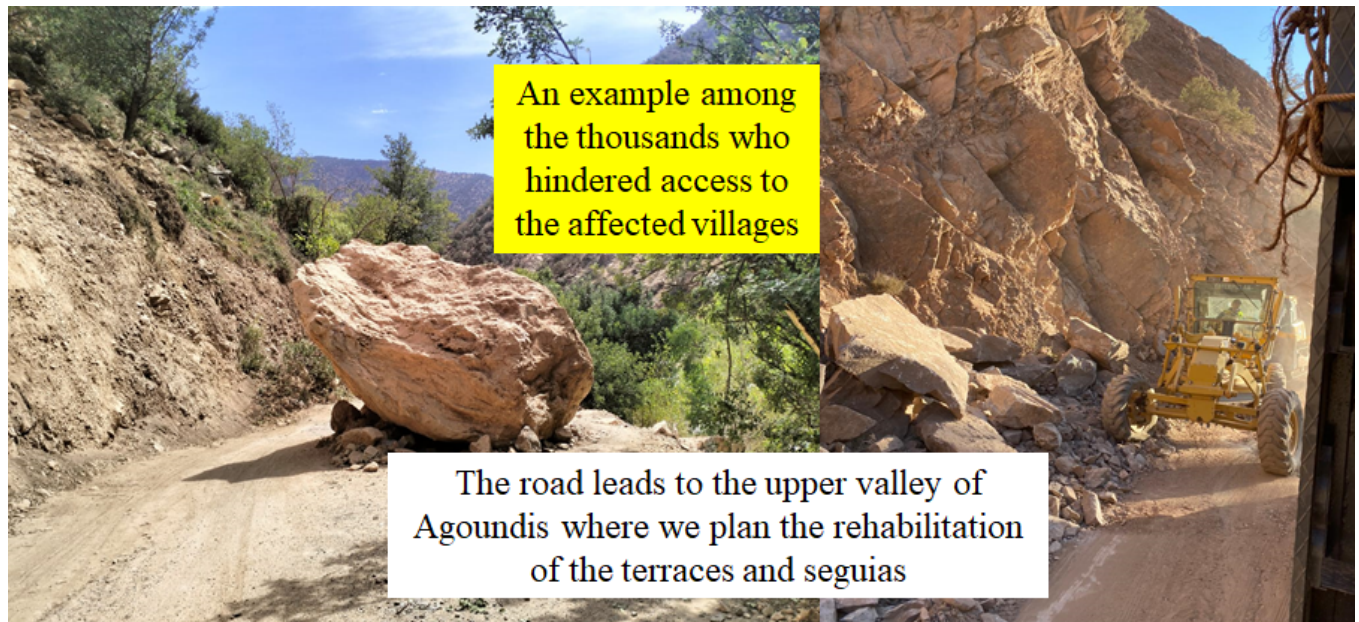
II/ Damage:

Homes and various infrastructures have been severely damaged by the earthquake. Field investigations are continuing and statistics have not yet been finalized. However, our teams on the ground identified initial damage:

- The tremors caused the collapse of several historic sites and others experienced serious cracks. A total of 28 monuments were damaged.
- More than 50,000 houses have been destroyed according to data collected by local organizations and the state census. The exact number of damaged houses has not yet been determined as access to many areas is still difficult due to the collapse of stones.



- Some schools are destroyed and others are severely damaged and unable to accommodate students.
- Roads, especially mountain tracks, are also blocked by huge stones. Currently, more than 90% of roads and tracks have been rehabilitated and more work is underway.



- Agricultural infrastructure has been seriously affected. Several terraces have been destroyed and cannot be used until repaired.
- Irrigation networks have also been damaged by the huge amounts of rubble and large blocks of stone falling downstream.

These points constitute damages of the earthquake in addition to the serious psychological effects people are facing due to the loss of family members, social disruption after loss of work, etc.

III/ Actions for the resumption of agricultural activities.

Given that the HAF supports farmers as part of its sustainable agricultural development plan, our teams, in permanent contact with the local population, were able to identify and assess the damage caused both in the orchards planted in collaboration with the HAF and others in its tree planting program.

There are two key infrastructures on which mountain agriculture is based. These are terraces and seguias.

1. Terraces

Agricultural terraces are key components of the agricultural landscape in medium and high mountains. Due to the lack of flat spaces for cultivation and irrigation in the mountains' hilly areas, farmers have used terraces, which are low walls that are built 40-100cm thick and 0.5-2m high, to facilitate the cultivation and irrigation of cereals, market gardens and fruit trees. These involve the construction of low walls 40 to 100 cm thick and 0.5 to 2 m high to facilitate cultivation and irrigation in hilly areas.



Photo taken by Abdellatif Outazgui, nursery caretaker at HAFSD



Photo taken by Ahmed Ait Hazzem, farmer trained by HAFSD (the highest douar in the Ait Mizane valley north of the Toubkal National Park)

Terrace cultivation has three main advantages:

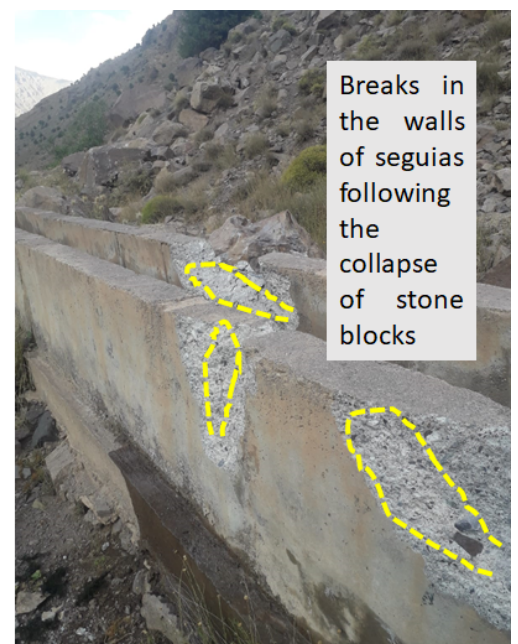
- a) Limits the elimination of nutrients from the fertile soil by rainwater, which allows for a healthier harvest with higher yield.
- b) Prevents plant leaching due to heavy rainwater flows.
- c) Reduces water loss and soil erosion.

Without these, agriculture will not resume and residents of the affected villages in the High Atlas Mountains may be forced to leave their homes, exacerbating the trend of urban migration.

2. Irrigation Network:



The damage to the irrigation network is great; breaks, embankments etc. The majority of seguias damaged and require maintenance or total reconstruction to make them operational



Unlike bour cultivation (depends on rainfall), terrace cultivation requires regular irrigation to ensure sufficient and sustained production, particularly during the dry months, which generally begin from May. Currently, the majority of the canals which carry water to the terraces are destroyed and require significant rehabilitation to ensure functionality.

Our future rehabilitation actions in collaboration with the local population will entail constructing small water basins to develop water-efficient drip irrigation systems. This last resource is becoming increasingly rare due to climate change, and water efficiency is obligatory for agricultural sustainability.

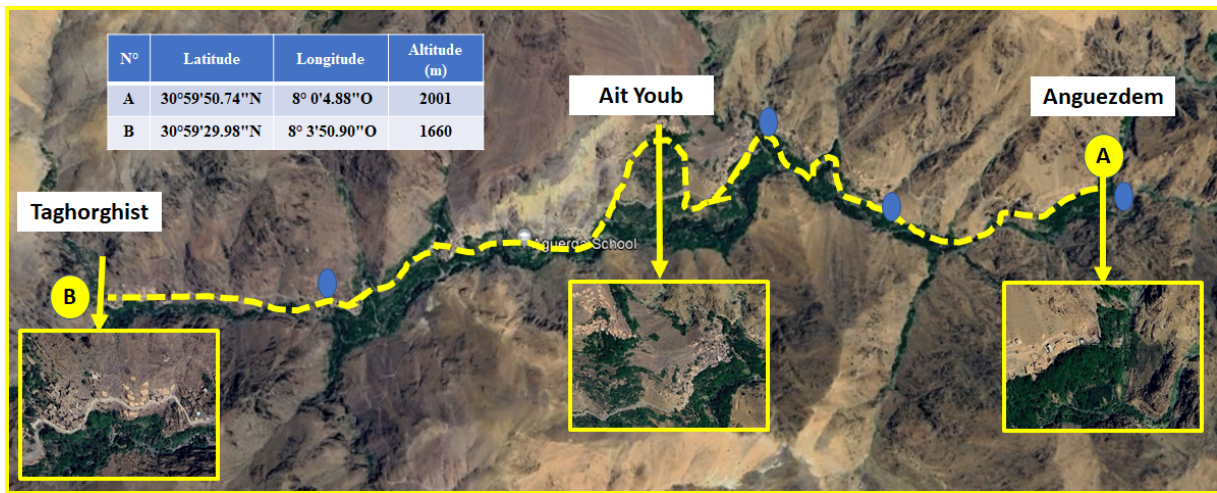
Budget estimate for irrigation water and drinking water for the benefit of affected douars

Désignations	U	Quantity	Unit price	Total
A/Irrigation et terrasses				
Rehabilitation of the irrigation network including iron outlet points	Km	30,324	50.000	1.516.200
Reconstruction of terraces (dry stone walls)	M	60.000	20	1.200.000
Water accumulation basin (6mx7mx2m) and including fence	U	7	60.000	420.000
Total A				3.136.200
B/Eau potable				
Purchase and installation of Ø 40 pipe	ml	5000	22	110.000
Purchase and installation of Ø 32 pipe	ml	10.000	12	120.000
Solar panels	U	30	1800	54.000
10 hp submersible pump	U	1	18.000	18.000
Total B				302.000
Total A+B				3.438.200

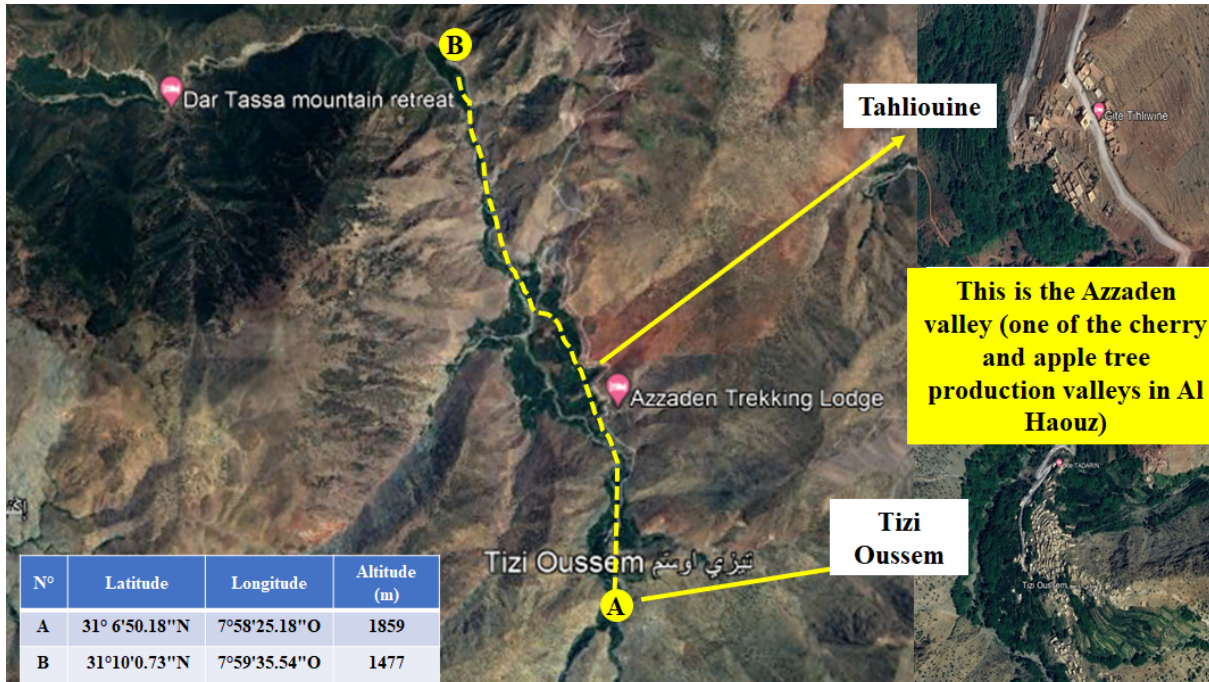
Detail of Needs

Commune	Douars	Needs				
		Seguia Km	Terrace ml	Solar panels unit	Pipe	Others
Aghoitim	Agar El Fokra			30	2320 Ø40	1 Pompe immergée
Asni	Arghen Mezzik	3,6	5.000			-
	Aremd	3	20.000			-
	Tamater Imlil	2,6	5.000			1 Basin
Oukaimden	Ait Lqaq-Iguenane	1	5.000		-1500 Ø40 -600 Ø32	-
Ouirgane Azzaden	Taddart, Tahlioine, Aguinane, Tizi Ousseml Id Aissa	4	5.000		2500 Ø40 -1500 Ø32	1 Basin
	Tizi Zouggarht Ait Harb Tiziane Ouaougmount	6	5.000		-3.000 Ø40 -1.000 Ø32	1 Basin
Setti Fadma	Tourcht	2,124	-		-2200 Ø40 -3500 Ø32	-
Ijoukak	Angzdem, Ait youb, Aguerda, Targhorrhst	8	15.000		-2500 Ø40 -1200 Ø32	4 Basin
Total		30,324	60.000		-14.020 Ø40 -7.800 Ø32	1 Pump 7 Basins

Ijoukak Commune



The upper Agoundiss valley constitutes one of the main right tributaries of the Oued Nfiis. It is very culturally, socially, and environmentally diverse. One of this area's main economic activities involves growing fruit trees, namely almond and walnut trees. Currently, with the participation of the High Atlas Foundation, farmers have introduced other fruit trees, such as cherry trees, quince trees and olive trees to increase diversity and reduce reliance on a select few varieties. Raising livestock, mainly goats which are adapted to the harsh environmental conditions in the region, is of secondary importance to the economy.

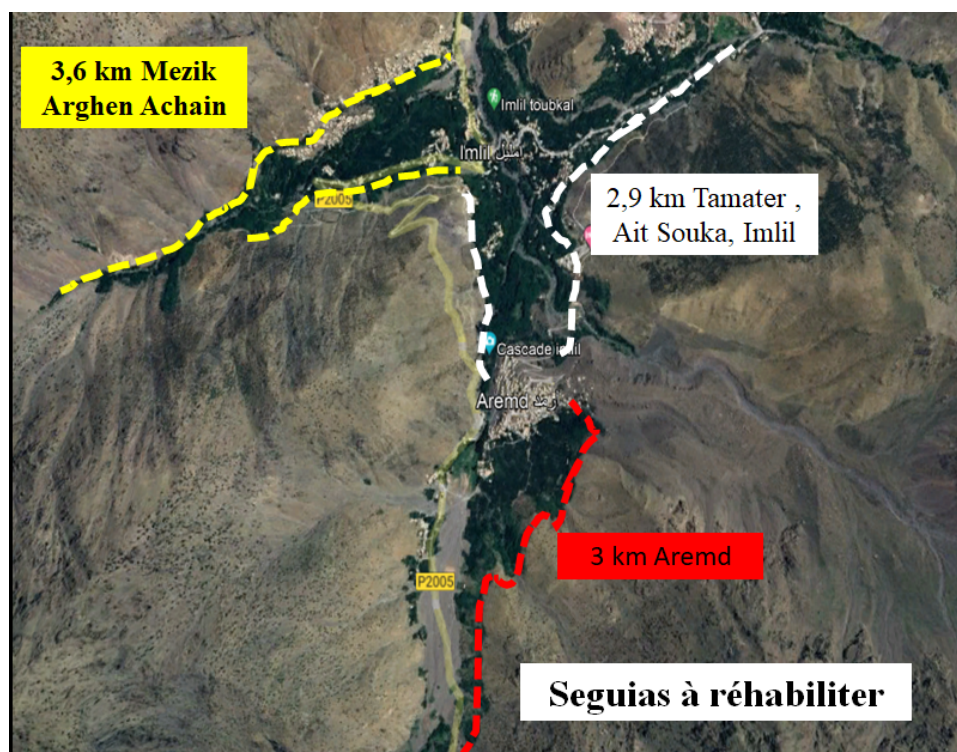


In this commune, the irrigation network was seriously affected by rockslides and terraces were destroyed following the strong tremors. We aim to rehabilitate two main segouia, namely:

1. Seguia Timskert over 4 km, which irrigates the apple, cherry, plum, peach and walnut orchards of the douars, Tiziane (60 families), Ait Harb (45 families), Ouaougmount (55 families) and Tizi Zouggart (100 families).

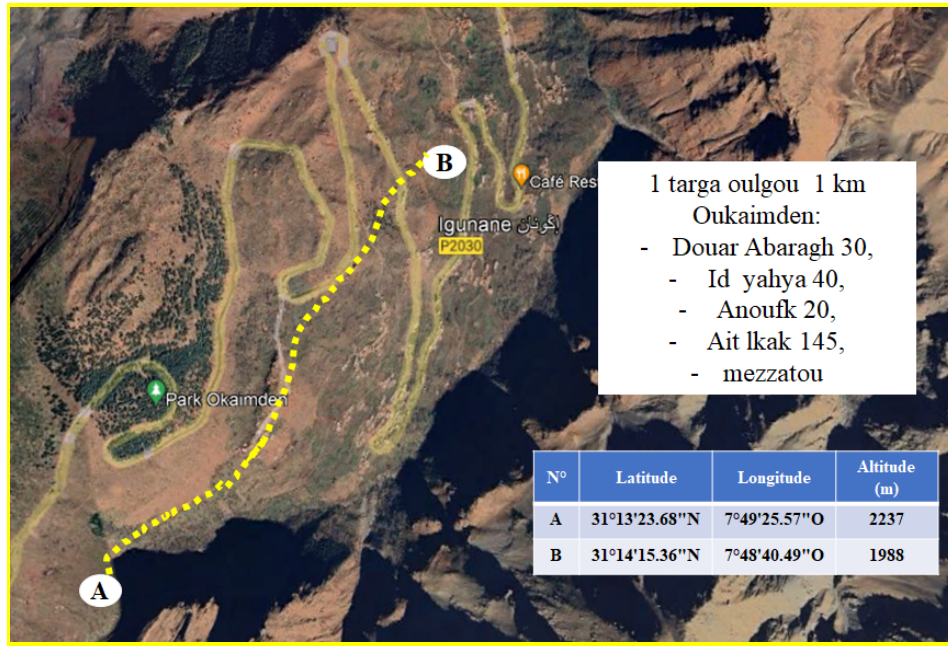
2. Targa Ouirgane over 6 km, which irrigates the orchards of Taddart (56 families), Tahlioune (48 families), Aguinane (50 families), Id Aissa (120 families) and Tizi Oussemmem (100 families) (6 deaths at this village). The area has received significant support from the HAF through the distribution of fruit trees from the Tadmamt nursery sold by the Regional Directorate of the National Water and Forests Agency as part of a partnership which links HAF at the National Agency for Water and Forests in Rabat.

Asni Commune



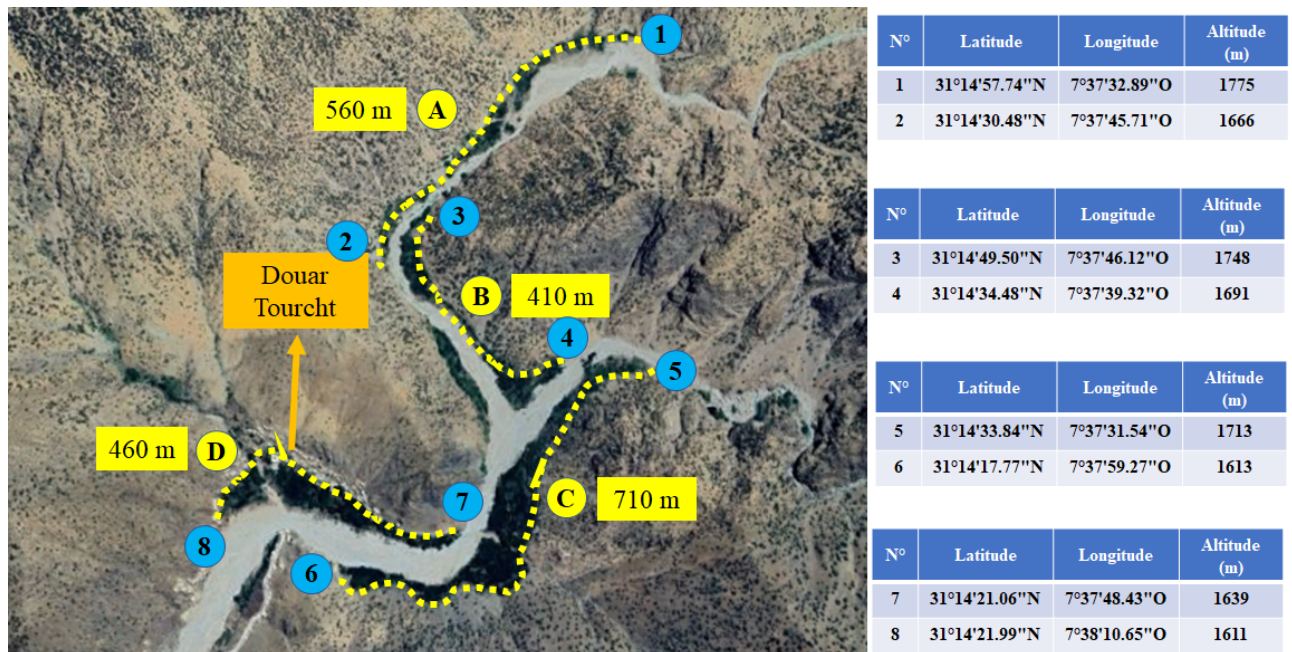
The Asni Commune consists of a group of douars that rely largely on ecotourism. More than 35,000 foreign visitors come to climb the summit of Toubkal. Agriculture constitutes the second income-generating activity for the local population. As with the Ouirgane valley, the area produces thousands of tonnes of fruit each year (peach, walnut, cherry, apple and quince trees).

Oukaimeden Commune



These douars are 7 km from the Oukaimeden ski resort. As with all the douars of Imlil, these douars rely on winter tourism, agriculture and livestock for their local economies

Setti Fadma Commune



Douar Tourcht primarily relies on agriculture and pastoralism for livelihood and income. It is one of the major producers of high quality cherry trees, which generate substantial income for farmers during the month of May.