

CBA Morocco Programme Community-Based Adaptation

Project Proposal FOUSS G FOUSS Association / Boumaad Douar

SUMMARY PROJECT PRESENTATION

Project Title	Agroforestry and soil and water conservation as strategies to build the Boumaad mountain ecosystem's resiliency and the local community's adaptive capacities
Project Site	Douar Boumaad – Rural Commune of Boudinar Province of Driouech Oriental Region
Project Leader	Fouss G Fouss Association for culture, the environment and social development Rural Commune of Boudinar
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Project Dates	July 2011 – December 2012 (18 months)
Total project cost	577,512 MAD / 72,734 USD (June 2011 rate – 7.94)
Amount solicited from the CBA	201,312 MAD / 25,354 USD
Co-financing	Community (in kind): 64,200 MAD / 8,085 USD Boudinar Rural Commune (in kind): 165,000 MAD / 20,780 USD Direction Provinciale de l'Agriculture de Nador (in kind): 153,000 MAD / 19,269 USD
Project Goal:	Build the local ecosystem's resiliency and strengthen the Boumaad community's adaptive capacities, particularly that of women, to the

	<p>increased irregularity and intensity of rainfall and periods of drought that have been contributing to the deterioration of the community's natural and economic resources; through the protection and conservation of water resources and the development of agroforestry as an adaptation strategy, combined with a local capacity building and revenue diversification programme.</p>
<p>Short Project Description</p>	<p>Located in the Rif Oriental, a few kilometers from the Mediterranean coast, the Boumaad community (approximately 320 residents) lives essentially off traditional mountain farming and extensive breeding. The village, located at the summit of a mountain, surrounded by rivers, suffers from strong isolation and lack of basic infrastructures, which has led a great part of the population to emigrate (today, women represent 75% of the village's population). The climate, which is basically Mediterranean (hot and very dry summers and mild and humid winters), has evolved gradually under the effect of climate change, with an increase in temperatures and heat waves, intensified drought periods and increased frequency and unpredictability of extreme rainfalls. The community's primary resources are therefore increasingly affected by the increased risks of drought, flooding and erosion. Climatic forecasts for the zone are predicting that these risks will increase in the future.</p> <p>Identified and developed from the ACCMA research programme's results, this project aims to strengthen the local ecosystem's resiliency and build the Boumaad community's capacity to adapt, particularly women, and face these risks, through the implementation of three complementary adaptation strategies: protection and conservation of water resources, soil fixation and regeneration, strengthening of agroforestry and diversification of revenues.</p> <p>The project is based on on the inclusive mobilization of the community, and aims to strengthen the capacities of the community and that of the village association representing it. It is benefitting from the support of community association Fouss G Fouss, and the Boudinar Rural Commune, for which it constitutes a pilot project, whose lessons will be disseminated later on and incorporated into the Communal Development Plan.</p>

1.0 PROJECT JUSTIFICATION AND RATIONALE

1.1 Project Context: Community and Ecosystem

Geographic and Socio-Economic Context

Boumaad is a small rural douar (village) belonging to the Rural Commune of Boudinar, in the Rif Oriental (between Al Hoceima and Nador, near the Mediterranean coast – see maps in annex). The douar is cut into three parts. It is located at the center of the commune, on a tall hill, and is surrounded by several oueds (rivers), which places it in a situation of isolation during the rainy periods.

The community of the Boumaad douar is made up of approximately 320 residents, distributed into 60 homes. The households are distributed throughout the entire douar, with a slight concentration to the south-west (near a water source) and the north-eastern region of the douar (near an old source of water that was destroyed).

The village's population is mostly female (women represent approximately 75% of the douar's population), because of the massive (permanent or temporary) emigration of men toward nearby or foreign urban centers. This male rural exodus is linked to the village's socioeconomic situation (isolation, lack of basic infrastructures and services, absence of economic opportunity, poverty), and also to climatic events (several successive years of drought that affected crops, the rises in water levels that placed dwellings in danger and isolated the village for months), and has aggravated the local economic problems and threatened the village's survival.

The educational level in the douar is low, especially for women, due to the persistence of certain traditions in the rural environment that still represent factors hindering girls' education.

Local Ecosystem and Natural Resources Management

The local ecosystem is a mountainous Mediterranean ecosystem, characterized by fertile clay soil, but degraded by erosion and salinization. It is comprised of a few annual crops and fruit tree cultivation, as well as a few forest trees and fallow lands. The zone's landscape is made up of rugged ground; therefore it is very vulnerable to erosion (which limits farm production in the zone).

The ecosystem represents an essential resource for the local population's survival. Indeed, the earth is indispensable for farming in order to produce the food required for all the households. Since farming depends entirely on water resources, they are therefore vital. The ecosystem meets the population's need for fresh water by regulating the water cycle, infiltrating the impurities contained in it, and by regulating soil erosion.

However, intensive use of the ecosystems to meet nutritional requirements contributes to strong erosion of these areas, through soil degradation, reduced water resources, pollution or loss of biodiversity. The douar's mountainous character prevents farmlands from being very extended and causes them to be in a state of advanced degradation because of the intensified water erosion from torrential rains, uneven slopes, and depletion of the vegetation cover. The soil's degradation and loss of fertility makes it unsuitable for farming. These farmlands do not provide sufficient yields for the population, which has ended up abandoning them.

The local population also requires firewood for heating and cooking various meals, particularly bread. The women collect this wood in the fields. It is in the form of farming residues, fruit trees (after pruning) or forest trees. But firewood resources have been gradually decreasing because tree cultivation has been increasingly put aside at the expense of more profitable cereal cultivation, which has pushed residents to overexploit the forest resources. Deforestation makes the ecosystem more fragile, making it extremely vulnerable to the impacts of climate change.

For the inhabitants of the Boumaad douar, earth and water are the most important resources. Therefore, farmers fight incessantly against the degradation of their lands and the possible shortage of water resources.

Subsistence Farming as a Means of Subsistence

The local means of subsistence are based essentially on traditional subsistence farming, whose production is intended for household self-consumption. Only three village farmers market their farm products and sell them to the souk in Tamsamani, a neighboring village.

There are **two kinds of farming: irrigated and "bour"** (rain-fed). Irrigated farming used to be a significant resource for the community. Nearly all farmers used to sell their farm products. Farming has significantly regressed not only following the decrease in water resources for irrigation, but also after the destruction of certain farm lands that were located near the Amekrane oued due to flooding. This irrigated farming occupied land all along a river (oued) called "Waroujen." It is currently located near the well, around the water source, along the irrigation canal (potatoes, carrots, watermelon) and on the banks of the Amekrane oued (turnips, peppers, garlic, onions). The "bour" lands are located particularly in the douar region called "Dhar Oubarrane." Cereals (wheat, barley and corn), legumes (fava beans) and truck farming (potatoes, carrots) are cultivated there. Regarding **fruit tree cultivation**, some olive, carob, fig, almond and a few apricot trees are still resisting the difficult climatic conditions and droughts that have strongly affected the local tree cultivation.

The population also practices **extensive breeding activities**, which does not constitute a real source of income for the farmers. The activity is minimal because the people do not own large herds. Most own 5 to 7 heads of sheep (up to 20 heads at most). Only five families own 2 to 3 cows per family. This therefore explains the absence of fodder crops in the community. Women practice mostly **poultry farming** (for family consumption). They are very motivated by goats, but lacking the financial means, the goat breeding that these women strongly would like to develop is lacking in the douar. Beekeeping, fishing and trade contribute as sources of income for the population, but to a lesser degree.

Nearly all the families resort to **funds sent** by relatives who have emigrated and which represent a significant income used to purchase seeds and food. Moreover, some men from the douar work in construction or as workers in big farms in the neighboring douars in order to earn an income that allows them to meet their needs.

The Role and Vulnerability of Women

Women contribute enormously to farming, during all the phases of the agricultural cycle: seeding, irrigation, weeding and field maintenance, as well as the harvest and storing of farm products.

They are involved both in cereal cultivation and market farming. Women's contribution is also significant in the area of breeding – they are responsible for breeding and maintaining the animals, and particularly cleaning the litter, feeding and watering the livestock. These activities have become increasingly difficult in a most problematic climate and hydrological context, caused by irregularly available water in time and space.

Women and young girls are the only ones responsible for seeking and gathering water, and they spend a lot of time getting to the sole source that supplies them with drinking water. For this source, 2 distribution outlets have been set up. The first source contains 3 outlets (*Photo 1*), and the second (*Photo 2*) contains 4 water outlets that no longer function and a watering place for cattle, that is damaged and can no longer hold water (*Photo 6*). This source is located at the foot of the mount and the overlooking landscape (*Photos 4 and 5*) presents a **strong likelihood of erosion through mass movement (landslides), which makes the source very vulnerable.**



Photo 1: Source's first outlet Photo 2: Second source outlet with one of the water pipes no longer functioning



Photo 3: Damaged water place to be repaired



Photo 4: View of the source with the overlooking landscape
overlooking the source



Photo 5: Landscape

In this douar that is not connected to the drinking water network, some households are located 1.5 km from the source and women can spend up to 1.5 hours per day going to collect water. The water is used for drinking, household duties and irrigation.

Women's specific vulnerability is caused by several factors. First, they are the ones who are responsible for managing the natural resources; therefore they face the impacts of climate change directly. The **chores of collecting water have become increasingly cumbersome** (since the resources have been diminishing), and allow less and less time for other activities. Women, as opposed to men, cannot leave the village to seek other sources of income (mobility is the first solution for adaptation implemented by the men in this region). They are therefore extremely dependent on the local resources, and thus vulnerable to climate change. The men's departure often leaves the women alone to handle all the domestic duties. Moreover, the poor productivity of the crops raised locally leaves these women with **very low incomes**, which is an additional factor of vulnerability. Note as well that they have only a **poor access to training and education**, therefore leaving them with few opportunities to develop new skills/activities. The project will aim to help the women face all of these different vulnerability factors.

Other Particularly Vulnerable Group: Small Farmers

Moreover, farmers, who live off small traditional farming typical of medium-sized mountains, have been lacking water since the only water basin that existed in the douar ceased to function approximately thirty years ago (*Photo 6*). These farmers had to dig a canalization that is fed from the source and goes to the oued (*Photo7*). The irrigation canal is often damaged, especially during periods of strong rain, which has harmed local farming, and ultimately altered the local ecosystem and inhabitants' living conditions.



Photo 6: Disappeared basin for collecting water to be repaired



Photo 7: Part of the irrigation canal to be restored

1.2 Climatic Context and Current Climate Risks

Local Reference Climate

Because of its position on the south-western margin of the Mediterranean, the north-eastern region of Morocco, where the rural commune of Boudinar is located, is found in a typically Mediterranean climate. Rain comes from Atlantic disruptions (Azores), which represent the principal origin of the masses of humid air in the Rif, and Mediterranean perturbations (related to the arrival of cold air masses from the north).

This region is also under the influence of Saharan pressures, which send the “chergui” and sirocco, which are hot and dry winds from the south and south-east.

The Mediterranean and arid character of the climate is very pronounced in the region, since **79% of the rains fall between November and May** (Mediterranean seasonal rhythm with two points in the fall and spring). The data of the last 25 years indicates a maximum of rain in November, while in older data, January and April appear to be the most humid. **July and August are very dry months**. A gradual fall in the quantity of rain occurs in February and June. Average annual rainfall is 250 mm. The number of days of rainfall does not surpass 46 days per year, and precipitations are characterized by interannual irregularity.

Average annual temperatures fall between 16.9°C et 18.8°C. Maximum temperatures are recorded in the summer (average of 28°C in August, with temperatures that can reach up to 34°C). These high temperatures have a significant impact on the environment because they generate a strong evaporation of the soil. Water reserves drop and many sources and oueds (rivers) dry up. However, minimum temperatures are generally mild (11.9°C in January) and drop only rarely below 9°C.

The hydrological characteristics of Boudinar’s drainage basin and the hydraulic function of its streams make the commune’s territory into a zone that is highly sensitive to flooding from overflowing rivers.

Current Climate Risks

Climate change accentuates these basic phenomena. Studies on the impact of climate change have shown that the zone is subject to climate events that have considerable repercussions on the local population. The region experienced periods of severe drought during the 1980s that adversely affected the population, which depends on natural resources and farming.

Moreover, the zone experienced extreme pluviometric events in 2007 (exceptional storms, downpours), which caused the Amkrane oued’s water level to rise. This river goes through the Boudinar commune and therefore caused it destructive flooding.

With climate change, the variability of precipitations has been increasing from year to year, increasing the risk of catastrophes, such as floods, mass wasting and water erosion. Moreover, the increase in temperatures and overall drop in rainfall lead to increased evaporation and reduced underground water resources. This lack of water leads to the abandonment of farmlands, a reduced vegetation cover, and therefore to increased erosion.

The Boumaad douar is therefore exposed to strong risks of erosion, flooding and drought. The entire population expects negative effects, particularly for women, who are more numerous than men in the village, and whose responsibilities make them particularly vulnerable.

The effects of climate change threatening the region include destruction of the vegetation cover, loss of soil, farm production and livestock, destruction of homes and infrastructures, degradation of comfort and well-being, an increased number of illnesses, a higher cost of living, and therefore poverty.

The population of the Boumaad douar states that throughout the year, it has to face local climate events. First, the floods no longer occur at the same pace as before, when a devastating downpour would occur once in ten years. This occurrence has become increasingly frequent (practically every year), and can occur between January and March, when rains fall at unusual intensities. Moreover, drought periods have become more frequent and have been growing in intensity, especially between June and August.

The local people state that they are no longer capable of forecasting any climate factor. Rains can fall when they are no longer expected, and water has already been a problem in the middle of winter, the usually rainy season.

Impacts of Climate Risks

The impacts of the climatic uncertainties have been affecting all aspects of the population's life and all sectors of socioeconomic activity.

- Impact on local farming, the local population's essential activity

Since the 1980s, the region has known increasingly severe periods of drought that have had a direct impact on the population, which depends on the natural resources and farming.

The decrease in water resources available for farmers has caused a decrease in local farm production, which depends directly on rainwater or underground water. This decrease in farm production causes most farmers to give up certain crops, or even their fields, leaving them to inevitable erosion and degradation. These farmers prefer sometimes to purchase farm products on the market, which is a less costly option for them (but not as sustainable, because their incomes will not be sufficient to meet their needs in the long term).

Furthermore, the reduced farming activity in the region, has led to reduced work days for the young people, who obtain their income from salary work as farm workers.

In sum, the reduced farm production resulting from the water deficit in the region has caused farm incomes to drop, generating a drop in the local population's means of subsistence.

- Floods: Material destruction and increased soil degradation

Another climate event that has been just as disastrous in the zone is flooding. The impacts of flooding on the local ecosystem and all aspects of the community's activities are significant and numerous. Flooding has caused great agricultural loss, caused landslides and a considerable decrease in productivity.

Similarly, floods affect the breeding sector. Livestock is lost, taken by the rise in water levels, and the pasture is destroyed. Since the population is made up mostly of small farmers, they lack the financial resources necessary to replace the lost livestock or to purchase fodder. Therefore, floods contribute to the small farmers' impoverishment.

Moreover, the latest floods experienced by the entire region in 2010 have caused numerous problems for the Boumaad douar community, which has experienced extreme isolation (lack of means of transportation to evacuate the disaster victims, women and patients, and to supply the inhabitants with first aid products). Power outages and all means of communication resulted, which led to the paralysis of local activities.

- Social impacts / poverty and exodus

The alternation of extreme and increasingly intense events (droughts / flooding) has affected the supply of drinking water for the community (destroyed infrastructures, decreasing resources).

The decrease of resources from farming has led to increased poverty and unemployment, and encouraged the young people to emigrate, which has increased the village's social vulnerability. Resources have been decreasing while the population's needs have increased – because of the impossibility to obtain the water necessary to meet household needs, the population now finds itself obligated to buy water to drink and at times even to water the livestock.

The resource therefore represents a true problem for the local population, which sees itself threatened by a total shortage of the vital resource. With the constant fear that the scarcity of water will worsen in the future, residents often seek to leave the douar and emigrate to find jobs abroad and thus provide for their families' needs.

The decrease in water has made the local population's means of subsistence unstable, threatened its survival and caused its well-being to deteriorate.

- **Impacts on daily household organization and increased women's vulnerability**

In order to provide sufficient water, the inhabitants (particularly **women**) have to spend up to two hours to **travel long distances**, often on paths that are in poor condition. They therefore devote a lot of time for this activity. The chore of collecting water has therefore become increasingly hard, difficult and risky for women, which has increased their vulnerability.

In addition, the increased scarcity of water and its decrease at supply points have provoked frequent conflicts to break out between the douar's residents.

- **Sanitary impacts**

The decreased quantity of water available in the douar has caused inhabitants to resort to using the water from the retention basins. This uncontrolled water can adversely affect the drinkers' health and therefore represents a danger to the douar residents.

Groups affected by the impacts of climate change

The entire population that is facing these climatic events is inevitably affected by their impacts. The community is very vulnerable at the socioeconomic level and its capacity to absorb the shock of an extreme event is limited because of the lack of basic infrastructures, the absence of other production factors, and the farming sector's weakness.

However, **it is the women who are particularly vulnerable because of the weight of the traditions** and cultures still having an impact on their effective participation in active life, and because of the differences with regard to access to social and physical resources for women in comparison with men that limit their opportunities for improvement.

Moreover, women and girls are ordinarily the family members in charge of managing the household's vital resources – they go to collect water, fodder, firewood, and often food. **During periods of climatic stress, they have to face a decrease in resources and an increased workload, which leaves them with less time to participate in decision-making and earn additional income.**

Small farmers are also increasingly dependent on the environment for their livelihood. Therefore, they are particularly affected by the climatic uncertainties' negative impacts on their zone.

Current response / Community's response to climate events (before the CBA project)

The material and financial means available to the commune and local population are limited. There are however traditional practices that enable the inhabitants to face the situation and adapt.

- **TOUIZA, the practice of mutual assistance and solidarity to perform large collective works**

To face the extreme and violent events, such as floods, the community has shown solidarity and gathered to perform community actions to repair the damage or clean up and restore the canalizations.

“Touiza” is a traditional system of mutual assistance, according to which each family provides the strength of work to achieve collective works. This ancestral system has enabled to build community infrastructures and maintain them.

Today, it has been harmed by rural exodus, which has removed from the village its work force (young people), while the needs for solidarity and community reactivity to face the impacts of climate change have become more significant.

- **Collect and save water in order to face periods of drought**

To complete their need for water, the population turns to the water from traditional impluviums (“Joubs”), that almost all households have. This rainwater collected in the impluviums serve for various domestic uses. To save the stored water, women do their laundry in the oueds.

Generally, the techniques used to conserve water are primitive and people qualified and specialized in this area are rare.

- **Increase access to water by digging wells or buying water**

Certain residents have resorted to digging wells (2 have been dug in 2005), but the underground water table is found at approximately 40 m in depth. The local population is quite poor and does not have enough means to deepen the wells. Therefore, these wells are not enough to cover the needs of the local population.

To compensate, the residents of Boumaad are forced to buy water and transport it by tank for drinking, to water the livestock and even at times for irrigation.

- **Finding work elsewhere / abandoning farming**

With the drop in farming production, the Boumaad residents have been trying to find other options in order to generate sufficient income to meet their households’ financial needs. Actually, some farmers who abandoned their fields have been looking for work in construction or farming in other neighboring cities or villages. Others have found that emigration is the only solution to face the living conditions that have become difficult locally. The Boumaad community has experienced a strong rural exodus. Nearly all the families have been surviving thanks to the resources sent by family members living abroad or in Morocco’s big cities.

Assistance networks in case of climatic disaster

The Boumaad douar residents have been meeting whenever necessary and in this way have formed a united social network that fights to maintain adequate living conditions for the douar’s entire population. The population cannot remain idle when faced with the distress of families that have become in a situation of danger and have lost all or part of their property because of climatic disasters. Under such circumstances, these families have received the solidarity essential to allow them to recover decent living conditions as soon as possible.

Similarly, certain residents have rallied around “Touiza” and have worked to preserve their douar’s infrastructures. They volunteer to repair among other things, trails, the water source and the irrigation canal that were destroyed by the strong rains.

On the other hand, those who have emigrated, in addition to the assistance they have been providing to their families to help complete their financial needs, have been sending financial aid to help repair the damage caused by climatic disasters to their douar’s infrastructures.

Long-term strategies

The residents of the Boumaad douar are aware that the choices they make today will affect not only their current lives, but also that of their children. Knowing that climate change will only become more difficult to manage in the future, they hope to develop long-term strategies to be capable of reacting to future climate risks. But the strategies currently being used are limited to “ad hoc” and short-term responses.

Investing in the children’s education / a long-term adaptation strategy: Certain families prefer encouraging their children to continue their studies, in order to be able to find a job outside the village and subsequently provide for their families. This approach belongs particularly to women, whose

priority is to be capable of providing their children with and education. But for most families, this strategy is difficult to accomplish – the lack of a nearby highschool represents a significant obstacle. Furthermore, most families cannot afford to invest in their children’s education, which is very costly (transportation, living accommodations, supplies, classes, etc.).

1.3 Future Climate Risks

At the National Level

Morocco’s position between two climatic belts, and between the anticyclone of the Azores in the west and the Saharan depression in the south-east, leads to the climate’s great spatiotemporal variability, with rainfall varying by more than 2 meters per year over the mountains in the north, to less than 25 mm in the south’s desert plains, with recurring and frequent droughts.

Regarding the Moroccan climate’s earliest trends, several findings are inclined to highlight a warming trend associated with decreasing rainfall over most of the country. This development has been accompanied by the intensification of extreme phenomena such as storms, downpours, droughts and heat waves. Such occurrences are increasingly inclined to take place more frequently, in spite of their uncertain character, and to become more accentuated.

The study conducted within the framework of preparing for Morocco’s initial communication at the UNFCCC presents climatic forecasts for Morocco and corroborates the country’s climate warming and aridity trends.

Indeed, the development of climatic scenarios for Morocco according to the IPCC methodology has produced the following results (stemming from the Initial National Communication and Second National Communication by Morocco to the UNFCCC):

- *Clear trend toward an increase in average annual temperature +0.6°C, +1.8°C and +3,2°C respectively by 2015, 2045 and 2075, with an increased frequency and intensity of the heat waves throughout the country.*
- *Trend toward a decrease in average annual rainfall: -6%, -13% and -19% respectively by 2015, 2045 and 2075.*
- *A disturbance in seasonal rainfall (winter rains concentrated over a short period).*
- *An increase in the frequency and intensity of frontal and convective thunderstorms in the north and west of the Atlas mountains.*
- *An increase in the frequency and intensity of droughts in the south and east of the country.*
- *A reduction in the period of snow cover (a shift of the altitude of the 0° isotherm and the acceleration of snow melting).*

Climate Changes Forecast for the Project Zone

The Direction de la Météorologie Nationale has already analyzed the observations registered in the study zone and released the future climate projections for the region. Temperatures will rise at the time when rainfall will decrease. The **decrease in springtime rainfall in the study zone over the years to come is estimated at approximately 30%**, which will have a strong impact on the ecosystem and living conditions of the local populations.

The rainfall decrease will also be apparent in terms of droughts that are expected to become more frequent and more persistent over time. In addition, the expected rise in temperature will lead to soil drainage and degradation.

On the other hand, vulnerability studies have shown that although the coast of the rural commune of Boudinar is not very vulnerable to elevation of the sea level, thanks to its elevated topography, it is **highly vulnerable to saline water intrusion**, which would have considerable repercussions on the quality of the underground water that has already been affected in certain parts of the commune, and consequently, on farming and the availability of drinking water.

Local Observations

These forecasts have been confirmed by **observations and testimony from the local population**, which has noted many changes that also affect precipitation patterns and temperatures. The population has noted a decrease in rainfall since the 1980s, and their increased irregularity. This decrease has led to periods of deficit rainfall that were at times followed by periods of drought. Moreover, residents have witnessed that the region periods of flooding that have caused considerable damage. The community states that in the past, flooding used to occur every ten years, but now the occurrence has become more frequent (practically every year).

The heat waves that have increased in frequency show that temperatures have increased in the region, which can only have considerable repercussions on the availability of water to the agricultural sector, and thus on the zone's socioeconomic development.

1.4 Impacts of Future Climate Change

According to the region's climate projections, temperatures will increase at the time when rainfall will decrease, droughts will become more frequent and more persistent, and devastating flooding will increase in frequency. These scientific forecasts, if proven true, would have disastrous consequences on the local population's living conditions.

The likely impacts would affect all sectors of life and activity in the community. The community's means of existence would be severely threatened.

Socioeconomic Impacts

The impacts of climate change would affect the infrastructures and resources upon which the community's survival depends directly:

- Material destruction: roads, irrigation canals, housing, school, etc.
- Decrease in water resources
- Severe soil deterioration, etc.

Local life would be affected in all its aspects: access to basic services, water supply, health, means of subsistence, etc. These impacts could generate strong social tensions and lead to conflicts over the use of resources, which would destabilize life and the means of subsistence, and could lead to a strong rural exodus, which would make the community even more vulnerable, without its dynamic force, and intensify the degradation of the ecosystem, which needs human input in order to be regenerated.

Children would no longer be able to pursue their education. They would have to leave school in order to participate in collecting the water that would be more rare and distant. Their parents would have to travel or migrate to find jobs and income outside the village.

Environmental Impacts

Climate risks would also affect the environment and ecosystem in the douar.

The ecosystem will indeed have to face temperatures and a rainfall level that differs from the current conditions. This ecosystem constitutes a pillar upon which the local population income and community organization depend. The Boumaad douar's economic activity therefore strongly relies on its water resources and agriculture. The climate risks expected in the zone would affect both sectors – water and agriculture.

- **Water resources:** Given the expected rise in temperatures, the need for water would increase for the population's different needs. The water table level would decrease and water salinity increase, given that the region is located near the Mediterranean coast. Water resources would be threatened in quality and quantity.
- **Local Agriculture:** Just as they will affect water resources disastrously, climate risks will affect the zone's local agriculture. In fact, the strong rains that would occur more frequently would intensify soil erosion and thereby provoke degradation and loss of the farm lands already very vulnerable because of their location in the mountains. The rise in temperatures

would increase the demand for irrigation water. This demand for water will not be met because of the increased stress on water resources. Cultivations requiring water would be doomed to disappear. Cultivation cycles would be shorter, perturbed and difficult to predict. Farmers, who have already reduced the cycles of some truck farming cultivations would perform more frequent cultivation rotations. Finally, **new diseases / pests** would be inevitable.

All of this would contribute to reducing farm yields, thereby affecting the douar residents' food security, since residents would feel obligated to get their supplies from the market, while their incomes will have strongly decreased.

The impact on breeding goes hand in hand with the impact on farming, since animal production is necessarily related to the plant production.

These expected impacts would greatly increase local vulnerability, causing increased poverty and rural exodus. Regarding farm production, the impacts, when upscaled at regional and national levels, would affect economic growth and food security.

Potential Reaction of the Community With Regard to Future Climate Change (without the CBA project)

Faced with these expected climate risks, the members of the Boumaad douar community must implement actions in order to adapt.

- To **face droughts**, douar inhabitants must strengthen the current practices of water capture and storage. In fact, they will have to build other basins to collect rainwater that will serve during times or severe drought.

Douar inhabitants should use floodwater to reload water tables artificially and increase their reserves. Water tables can meet the needs for water during deficit periods.

Furthermore, the local population should drastically save water, to be managed rationally.

- To **limit the impacts of strong rains and devastating flooding**, the community should continue to repair the damage caused to the douar's infrastructures and resources.

Village meetings toward "Touiza" or community action, should be increased in order to repair the trails destroyed, protect homes, develop plantations and techniques to fight against soil erosion.

- With decreasing water resources, limited soil resources and unstable climatic conditions, douar inhabitants will have to meet the challenge of **improving farm production** in order to ensure food security. They must optimize the choice of varieties of seeds that are more resilient and would allow for mineral fertilization of the soil. Farmers might resort to brackish water to irrigate the crops they will have developed in order to adapt.

All of these adaptation strategies existing in the community and relying on traditional practices risk unfortunately to be insufficient to face the extent of the impacts of climate change. In fact, these strategies involve an increasing and more significant investment on behalf of the community, which has become more vulnerable and exhausted, and possesses gradually diminishing resources (human and moral).

Family networks providing assistance to the douar's residents in case of a climate disaster, although they are enjoying more comfortable living conditions, are not protected from the impacts of climate change (or economic crises, particularly for those who have emigrated to Europe). If climate change becomes more severe, assistance networks could become insufficient or even collapse. The community relies on help from people that are themselves vulnerable to climate change. And the demands for support to the victims are apparently colossal and surpass the family networks' capacity to help. These family networks are apparently no longer capable of providing the same services. We can even expect increased individualism with regard to these impacts.

Finally, ***if the community has managed to face many of the first impacts of climate change through adaptation, it can no longer do so in case of the situation's aggravation.*** In fact, the strategies implemented by the local population are traditional and vulnerable. If climate risks become more severe, **no action taken by the local population alone can lead to real adaptation.**

Support from partners, especially the CBA programme, is intended to support the community in order to strengthen its adaptation practices, reduce its vulnerability, and better face the future impacts of climate change.

1.5 Project Approach

In the absence of climate change, the basic threats weighing on the Global Environmental Benefits (GEB) are related to the following three aspects:

❖ **Baseline climate factors (current situation)**

- Climatic severity characterized by aridity and poor rainfall.
- The succession of drought periods.
- Frequent heat waves.
- Frequent downpours and devastating floods.

❖ **Anthropogenic factors:**

- Intrusion of wash water into irrigation water.
- Poor water management.
- Abandonment of farmlands that are difficult to cultivate, thus leading to land degradation.
- Degradation of the vegetation cover.

❖ **Factors relating to the nature of the ecosystem:**

- Abrupt slopes that are very vulnerable to erosion.
- The soil's crumbly nature.
- Land salinization caused by proximity to the coast.

Threats of Climate Change

Climate change makes the ground very vulnerable to erosion, which becomes more pronounced with the increasingly intense and untimely alternation of droughts and floods. Soils become degraded and less favorable for the rain-fed farming practiced in the region and for natural vegetation regeneration. This translates into reduced incomes for farmers and increased poverty.

Project response

The project's goal is to build the local community's capacity to face the negative impacts of climate change better. It will soften the "baseline" threats to the GEB by reacting to the damage caused to the environment and infrastructures conditioning life for the douar's local population. This project will benefit the local population by strengthening its resistance to climate change and reducing its vulnerability toward this phenomenon.

Conservation and management of water resources will be improved, making the community more resilient. Local farming and tree cultivation will be strengthened, thanks to resilient planting and to improved irrigation infrastructures.

The project's activities will enable the population to secure its living conditions, reduce poverty and household vulnerability toward the harmful effects of climate change, and it will help reduce the rural exodus that has itself contributed to weakening the ecosystem and community. Moreover, the project will serve as a base for the development of new economic activities that may help the community increase its income and promote its land in the future.

The community will be supported to improve water management, particularly at the time when it has become increasingly scarce. Farming will be easier for farmers who will benefit from the irrigation canal to achieve successful crops. And thanks to the newly built water basins, women will spend less effort and time to gather water, and the pressure on the only water sources will be alleviated.

The project's interventions are structured in the following manner:

- **Securing access to drinking water through the protection of the village's sole source** in the face of the damage caused by climate change (see technical fact sheet in annex). The source where the entire village obtains its drinking water supply has been violently affected by the landslides caused by climate change, and is severely threatened. Its protection is an

important adaptation measure for the community (sanitary and social implications, particularly for the management of women's duties), and will enable to promote the rehabilitation and regeneration of the fragile ecosystem situated around the source. The project will mobilize the community to establish a **mechanical / biological anti-erosion combination** with a series of small dry stone thresholds (5 x 5 m³, or 25 m³), strengthened by soil-fixating plants (aromatic and medicinal plants, prickly pear/cactus, fruit trees) to ensure sustainability.

Dry stone thresholds are very suitable for small ravines, are simple and cheap to design and build, and are very durable because they promote compost platform reconstitution for fixating plants.

Moreover, the platform surrounding the source will be rearranged in order to facilitate water collection and reduce the difficulty of this work, which falls on to the women.

- Around the source and basins, the cultivation of **3 ha of aromatic and medicinal plants** (Artemisia, rosemary, mastic shrub) and prickly pear (cactus) will allow for **soil fixation and contribute to its regeneration, while protecting the infrastructures (sources and basins) and their surroundings**. These AMP will be the gateway toward improving local living conditions by providing the basis for future income-generating activities, particularly geared toward women. The project will enable to build the capacity to manage and grow AMP, and ideas for future projects to allow for the plants' resilient production and marketing.

- **Traditional water collection and conservation practices** will be consolidated to face more irregular and intense rainfall:
 - o **1 traditional basin intended to collect runoff water will be refurbished and strengthened**, so as to increase its capacity of absorption and durability against intensified droughts and rainfall.

Indeed, this traditional basin is currently not strong enough to collect the runoff, whose flow is increasingly concentrated over time; or to conserve enough water to enable the population to irrigate its crops during periods of drought that have been growing longer.

Its sturdiness and capacity to absorb and retain water will be strengthened by the introduction of a descending slope upstream, by the protection of low walls downstream limiting the flow, and a covering of stones to reduce infiltration while preserving certain permeability, which is beneficial to the ecosystem.
 - o **Two new basins will be created** to provide optimal coverage of water retention efforts in the village (thanks to distribution throughout the village's three sub-sections).

Improving the traditional basin system will enable to increase water resources conservation to face growing periods of drought. With a greater capacity of retention and reduced evaporation, the community will have water resources at its disposal for the hot weather months to be used for irrigation, to water the livestock and for various domestic uses.

Thanks to the water collected in these reservoirs, women will have larger quantities of water at their disposal to perform household duties. **They will therefore have to travel long distances to the source only to obtain drinking water. Hence, they will save a lot of time that they will be able to devote to other activities**, such as educating their children, managing the household, and farming.

The problems relating to water will therefore have been overcome because women will have less difficulty obtaining this resource. Consequently, these women's standard of living, comfort and well-being will have improved.

These water-collecting reservoirs will be maintained in order to store water for as long as possible. Therefore, they will be filled during rainfall, and also be protected against various types of pollution. During rainy periods, douar residents will use the water collected in their impluviums while the water in the reservoirs built for the project will be stored in order to be used particularly during the dry periods.

In the event of a severe drought causing the quantity of water available from the source, residents will be capable of adapting more easily because they will have the water stored in the reservoirs at their disposal.

Moreover, particular emphasis will be placed on men's participation in this project: mobilization of husbands and brothers to contribute to implementing the activities. The authorities will also be mobilized to facilitate and support the project.

These basins will enable moreover to protect the region's soil against floods that are increasingly sudden and erosive, thereby promoting **soil conservation and protection of the ecosystem**. Finally, increasing their absorption capacity will encourage water infiltration and help **refill underground water resources**.

- **An agro-forestry intervention will enable to strengthen 100 ha of degraded land and stabilize the soil**, plagued by intense erosion. Resilient and endemic arboricultural species have been chosen according to their reputation for adaptability and their power of soil fixation. They are also appreciated for their fruits, which will support subsequent economic activities:
 - o **400 carob trees** – resilient indigenous forest trees that adapt to climate change. The carob tree has a strong power of nitrogen fixation, and is perfectly suited for rocky and dry soil, which it contributes to fixating through its very developed root system. This is a tree with slow development, but whose production (after 10 years) will provide a **sustainable and profitable for community economic activities**.
 - o **10,000 olive trees** – Mediterranean tree par excellence, very suited for poor water resources, and with strong resiliency toward drought (the olive tree, as opposed to many trees, is regenerated after a period of drought). This tree with high symbolic value also has a significant economic value (production of olives and its derivatives, which are essential for the community's daily life).
 - o **500 almond trees** – very suited for this climate, and with a strong economic potential, yet requiring regular monitoring and particular care.

Strengthening local agroforestry tree cultivation will have direct and indirect effects on the ecosystem (soil fixation and erosion control, as well as generating firewood out of the forest, and reducing the pressure on forest resources), and on the local economy (generating additional income for the community). These results will be achieved thanks to a local awareness raising and capacity building programme.

- **Protecting and strengthening the irrigation canals**, regularly damaged by the strong rains. They will be rebuilt and made to resist extreme climatic uncertainties better. This canal will provide irrigation to farmers for their crops and enable to reduce the risk of abandonment of farmlands by their owners.

The inhabitants built the two kilometers of irrigation canals. Most sections were damaged after the floods of 2009. Local farmers can no longer irrigate their fields as easily as before. Some had to abandon their fields. The goal of this action is to restore 1.5 linear km of the irrigation channel to allow for the fields to be irrigated and prevent them from becoming fallow during the dry season. Restoring the irrigation canal will enable the village residents to go about their farming with complete peace of mind, by doing the following:

 - o Prolonging crop irrigation time at the end of the dry season;
 - o Allowing the water to flow and preventing flooding during the rainy season.

Restoring the irrigation canal will also allow the village's women to **develop food crops again** (vegetables, legumes, etc.) and therefore participate in **strengthening food security and increasing their household incomes**.
- **Reducing women's vulnerability**: By facilitating women's daily duties and allowing them to save time and effort, the project will enable to reduce their vulnerability. Women are at the front line with regard to climate change because of their strong involvement in managing the

natural resources, and because most of them are alone in managing their homes. Their capacities will be increased thanks to a training and support programme to develop alternative and resilient activities (aromatic and medicinal plants). Development of the platform surrounding the water source, around which women gather, could make it a place for women to rally and gather, and the base for subsequent projects.

- A **community capacity building** programme will be implemented in order to raise the population's awareness about the impacts of climate change on their environment and the erosion control. The community's capacity to adapt will be increased through complete and practical training on agroforestry and water and soil conservation management in a mountainous zone. Women in particular will benefit from training on producing aromatic and medicinal plants and an introduction to AMP-based revenue-generating activities. Training includes visits to test sites in the region.

Potential for Dissemination / Impacts on Local and Regional Policies

This project will allow for an increase in the local population's mobilization and trust, which in turn will allow the local population to become the driving force for adaptation in the Boudinar commune. This pilot will enable to promote and disseminate concrete practices in the field of agriculture, and to channel development in the water and agricultural sectors. This will be possible thanks to the dissemination of information toward other local and regional actors who will be able to draw inspiration from lessons learned from the project.

Locally, the project is relying on active support from the Rural Commune of Boudinar and its elected representatives, as project partners. **The Commune will integrate the lessons learned from the project in its Communal Development Plan**, in order to promote an approach of adaptation to communal change in all of the Commune's douars. The Rural Commune's involvement in this project (resilient planting) falls within the **Plan National Maroc Vert**.

At the regional level, this dissemination will be conducted through the network of adaptation partners developed by the Programme for research and capacity building "ACCMA" (2007-2010) in the project region (Nador / Al Hoceima). This network will enable to promote and disseminate the Boumaad CBA experience and reach a large number of regional stakeholders: associations, elected representatives, government extension services (agriculture, forestry, tourism, etc.), who are already organized into networks and expecting concrete experiences.

Obstacles to Capacity or Awareness Raising in the Community / Strategies to Overcome Them

Principal barriers are women's lack of information and knowledge, and the local culture, which impedes on women's participation (requirement of authorization from men to perform any activity outside the home).

Volatility of women's participation is also a barrier: women have trouble committing to a long term project. A change in their personal situation can put an end to their participation (for example, a young single girl can stop participating in the project once she gets married, either because she will no longer have time for the project, or because her husband does not give her authorization). The project will actually aim to encourage women's participation while respecting local cultural traditions – women will be mobilized in a manner that they are comfortable. The prospect of raising their incomes and living conditions in the long term will encourage their lasting participation.

2.0 COMMUNITY OWNERSHIP

2.1 Project development

Development of the project and its components took place through a cooperation between project leader, the Fouss G Fouss association, and its partners. The local Boumaad douar population has

been involved from the beginning of the project to help achieve this work. The community has been mobilized and consulted during about ten workshops and investigative meetings in the field.

Community mobilization began throughout implementation of the **ACCMA programme** (2007-2010) – a research and capacity building programme for local actors and decision-makers on adaptation to climate change, which has been implemented in Morocco's eastern Mediterranean coastal zone. Funded by the International Research and Development Centre (**ICRD**), this project has involved national partners such as the Ecole Nationale Forestière d'Ingénieurs, Direction de la Météorologie Nationale, the Université Mohammed V in Rabat, as well as international and regional partners (see http://www.accma-maroc.com/docs/ACCMA_profile_fr.pdf). Within the framework of the ACCMA programme, the community, the association and local partners participated in numerous information and awareness-raising workshops throughout the programme's three years, which resulted in this CBA project's formulation.

Project development was conducted in continuity with this mobilization, and built on what has been learned from the ACCMA programme. Thanks to its CBA planning grant, the association hired a **consultant from the ACCMA team, Manar MATAH, who supported the project's development and local mobilization, and coordinated the writing of the project document for the association, with support from the Morocco CBA team.**

Four series of community workshops with women and men enabled to assemble the project. They allowed to establish a diagnosis of local vulnerability, to highlight the principal issues in the douar with regard to climate change, and to develop the project. These workshops enabled to take the needs and ideas of all the most vulnerable groups and members into consideration. Finally, it was the proposals and priorities expressed and debated by the douar community's most vulnerable members and partners that were taken into consideration during formulation of the project.

A certain number of **diagnostic outings in the field were conducted with the project leader and local population** to note the reality in the field and guarantee a relevant project assembly, while offering the best options to be implemented.

The approach used to develop this project was totally participative, ensuring a framework for community communication to identify and develop a project together with the community a project that was concerted, negotiated and supported by the **research team** (ACCMA, consultants, CBA team). Within this framework, a certain number of participative tools were used: participative maps, seasonal calendars, diagrams of daily activities, vulnerability evaluation workshops, etc.

2.2 Project Implementation

As project leader, the Fouss G Fouss association will be responsible for monitoring and coordinating activities, capitalization and reporting, as well as community mobilization and capacity building of the participants. The association is responsible for the project's proper implementation and permanent dialogue with the community and partners.

It relies on a community based organization based in the village, the "Association de Boumaad pour le Développement et la Solidarité" (Boumaad association for development and solidarity), whose capacities will be built throughout the project. Together, both associations will mobilize the community to participate in the project and contribute actively to its achievement. The community's contribution will appear essentially in the form of the local work force, access to land, tools, etc. As for the association, it will be responsible for monitoring the activities, capitalization and reporting.

The project interests the entire community, but particularly women, who are in the front line of resources management (namely water). Thanks to this project, their duties will be made easier and more efficient. They will be more aware and trained better in the area of resources management and the field of agricultural techniques that are resilient to climate change. Women, and also through the ricochet effect, the community's men will have improved their capacity to adapt for climate change.

Community members, women in particular, were mobilized from the project's preparatory phase (diagnosis, preparation of the activities). They will be empowered to intervene in its implementation and monitoring the activities.

The men of the community will be involved alongside the women during the project's implementation. It is not a matter of reinforcing the differences between the genders, but rather to create a dynamic

with the women, and make the most of and enhance the men's participation. Then, volunteer groups will be formed, activity by activity, to enable each one to participate within its means and capacities.

The project will have numerous impacts on the community. It will enable to promote the value of the community's action with regard to the water issue (which over the last few years, because of climate change, has represented an increasing source of local conflict and tension). Thanks to the project's results in the area of water resource management (rebuild irrigation canal, water source developed, reservoirs built to collect and store water), the village's general environment will be improved, as well as the social climate.

The most vulnerable members will benefit from the project's actions. Women and particularly young girls will see the hardship of their chores reduced and spend less time collecting water (which represents an advantage also with regard to their health). Through their participation in this project, and their intervention particularly to implement the cultivation of aromatic and medicinal plants, women will develop new activities, which will enhance their social status.

The community will be mobilized continuously throughout the project and participate in the decisions and in planning the activities, through meetings organized regularly every month in the village.

2.3 Project Finalization and Sustainability

It should be noted that for the Boumaad community, this project represents the first development initiative, and as such, it must meet the most essential and priority concerns of the village inhabitants, in order to guarantee their participation. One of the project's goals is therefore to create trust and encourage the inhabitants' active participation in their village's development, an approach that is currently non-existent in the village.

The project will involve all community members and attempt to motivate the community through information sessions and regular monitoring of the project (participants are more inclined to participate when they are also associated in the decision-making). The project is based on **traditional participation and solidarity techniques**, which will contribute to ensuring its sustainability:

- Community meeting every two months
- Community and supportive maintenance of the infrastructures / collective resources (touiza, contributions, etc.)

Community members will give of their time to achieve the activities, and commit to **maintaining all the accomplishments** (plantations, basins, stone terraces and contour lines, etc.). They will give the project access to the plots of land needed for planting.

The project is relying on local solidarity practices to implement the activities, which will ensure inclusive participation. Moreover, it aims to **reassert and restore the traditional existing community adaptation practices** (water collection, terrace cultivation, endemic vegetation), which will promote the appropriation and sustainable maintenance of the project's achievements.

The project will be a means to stimulate the population's motivation and integration into the adaptation and development projects. The project's activities will lead to **improvement of the environment, farm production, consideration of the most vulnerable groups and improvement of local living conditions**.

The project strongly relies on **capacity building**. This is essential to sustainably reduce vulnerability. Particular emphasis will be placed on **women's participation, whose role in natural resources management and adaptation is essential**. Consolidation of community capacities will promote sustainability: *"If we conduct this project and afterward protect everything we have built, we will have acquired a savoir-faire in agriculture, we will be properly trained, and therefore, we will be able to adapt better."*

Finally, the project's incorporation into **an integrated process at the Communal (CDP) and national (Plan Maroc Vert) level**, thanks to **active support from the Rural Commune of Boudinar** is an additional element of sustainability and dissemination of the adaptation practices.

Achieving this project and its success will give a boost to local development and represent a development model for the commune's other villages. This will create positive competition between them with regard to income-generating activities.

Volunteer Contribution to the BOUMAAD CBA Project												
Project Activities (in which people expect to be contributing in a voluntary manner)	Description of volunteer contribution (capacities, knowledge, savoir-faire, manual work, materials, tools, etc.)	Total number of volunteers mobilized	Women	Men	Elderly persons (over 60 years of age)	Young people (under 25 years of age)	Persons with disabilities	Local	National	International	Expected number of volunteer days	Monetary value of the volunteer contribution, including work and materials (to be considered as co-financing in the budget) – specify method of calculation and monetary unit
Agricultural tree planting (olive, almond, carob trees)	- Labor (digging, planting, irrigation) - Tools (shovels, pickaxes) - Parcels	20		20		6		20			15 days	15d*20v*70 dh= 21,000 dh
Construction of basins to collect rainwater	- Labor (digging, transportation, placing the stones, installing the cover, maintenance) - Tools & parcels	20		20		6		20			20 days	20d*20v*70dh= 28,000 dh
Restoring the water source	- Labor - Tools and materials	10		10				10			10 days	10d*10v*70dh= 7,000 dh
Planting AMP	- Labor - Tools & parcels	10	10					10			10 days	10d*10v*70dh= 7,000 dh
TOTAL		60	13	78							55 days*60 volunteers = 3,300 volunteer days	63,000 dh
<p><i>For reference: What are the volunteer mechanisms that already exist within the community prior to the CBA project? (for example, traditional mutual assistance mechanisms, associations, etc.)</i></p> <p>Within the community, "Touiza" represents the principal traditional volunteer and solidarity mechanism already existing (it applies to works of general interest, such as infrastructure maintenance, and also cooperation with farm work). Particularly difficult conditions have somewhat reduced the local power of solidarity, and the departure of numerous inhabitants in search of better living conditions has reduced the dynamic force present in the village. The project is based on these traditional practices and aims to consolidate them while building the capacities of the village association.</p>												
<p><i>For reference: Number of volunteers in the community already engaged in activities for adaptation to climate prior to the CBA project.</i></p> <p>The village population numbers approximately 320 inhabitants, where approximately 75% are women. Among the 80 men of the village, approximately 40 have often been involved in community actions, particularly after climatic uncertainties that have destroyed the local infrastructure – repair of the irrigation channel, restoring trails and the water source..</p>												
<p><i>For reference: What are the opportunities or obstacles that can facilitate or prevent people from engaging in volunteer activities?</i></p> <p>Restoration of the irrigation channel will be conducted within the framework of the Direction Provinciale de l'Agriculture (DPA) and will require labor to achieve this action. The DPA can expect to hire local workers who will be compensated and would therefore be willing to voluntarily for the other project activities.</p>												

3.0 DESCRIPTION OF THE PROJECT PROPONENT

3.1 Presentation of the Organization, Past Projects and Capacities

The FOUSS-G-FOUSS association for culture, the environment and social development, whose head office is located in Boudinar Centre, is open to the entire public and is based on the principles of independence and democracy. It aims to raise public opinion's awareness toward its participation in environmental preservation and cultural development, achievement of social, economic and cultural development, contribution and consolidation of the philosophy of solidarity between the different social groups, raise consciousness on issues regarding children, youth and women, and contribute to the fight against illiteracy.

In the area of the environment and climate change, it has led the following actions:

- ✓ Acquiring vehicle to pick up household trash (Tractor + Benne) in the center of Boudinar;
- ✓ Planting trees in the center of Boudinar;
- ✓ Facilitate access to water sources;
- ✓ A day of study on ecotourism in the Rif;
- ✓ Achievement of a small goat breeding project to benefit rural women in the Ifassiène Douar, falling under the Boudinar commune.

Its partners include the following:

- The Rural Commune of Boudinar;
- L'Inspection Régionale de l'Aménagement du Territoire, l'Eau et l'Environnement (Regional inspection of land-use, water and environmental planning);
- FUED (The Forum of Urbanism, Environment and Development) in Nador;
- The National Initiative For Human Development (INDH);
- The Social Development Agency in Oujda;
- The Secretariat of State responsible for family, children and disabled persons;
- The ACCMA programme;
- ASTICUDE (Association Thissaghness pour la Culture et le Développement) in Nador.

4.0 PROJECT DESCRIPTION: DETAILED LOGICAL FRAMEWORK

Project Goal

Strengthen the resiliency of the local ecosystem and consolidate the Boumaad community's adaptive capacities, in particular those of women, in the face of increased irregularity and intensity of rainfall and periods of drought, which have been contributing to degrade the community's natural and economic resources; through the protection and conservation of water resources and development of agroforestry as adaptation strategies, consolidated by a local capacity building and revenue diversification programme.

Outcome 1.0	Indicators	Sources of information and monitoring methods
The ecosystem's resiliency is sustainably strengthened through implementation of a strategy of water resource protection and conservation, and soil fixation	<p><i>Erosion volume (at least -30%) avoided thanks to water retention and soil fixation through AMP</i></p> <p><i>Water reserves protected and secured thanks to the source's restoration</i></p> <p><i>3 basins are restored, securing more than 500 m³ of water retained per year</i></p> <p><i>The quantity and duration of water retained increases by at least 20%</i></p> <p><i>Access to water is being facilitated and the time spent on water collection chores is reduced by 1/3 for women</i></p> <p><i>The volume of water from irrigation is collected and managed conservatively</i></p>	<p><i>Weekly measurement of water contained in the basins and creation of a water retention schedule</i></p> <p><i>Measurement of the quantities of water secured thanks to the source's protection</i></p> <p><i>Measurement of the time spent by women on water collection chores</i></p> <p><i>Reports on the project's activities / Photos</i></p> <p><i>Final evaluation of the project</i></p>
Output 1.1: Access to drinking water is secured through the restoration and protection of the village's sole water source		
Activities of Output 1.1	Means necessary	
Creation of 5 small dry stone contours (5 x 5 m ³)	<p>Technician to measure the site and provide technical recommendations to implement the protection system / Guidance and monitoring of the work</p> <p>Materials and their transportation: Stone (extraction on site) / Tools and equipment</p> <p>Qualified labor / unqualified labor</p>	
Installation of the platform to access the source	<p>Measurement of the site and technical recommendations</p> <p>Local materials 10*10 m (stone and wood)</p> <p>Coordination / Labor / Tools</p>	

	Output 1.2: Installation of 3 rainwater and run-off conservation basins: 1 basin is restored and strengthened; 2 new basins are created		
	Activities of Output 1.2	Means necessary	
	Cleaning the basins / preparing the sites	Labor / Tools	
	Installation of the basins to increase water retention capacity and reduce evaporation: <ul style="list-style-type: none"> - Digging a descending slope from upstream - Installation of the bottom of the basins (flat slab) - Construction of small stone walls downstream 	Tractor / mechanical shovel rental Recovery of stones when digging Labor	
	Output 1.3: Aromatic and medicinal plants are seeded and/or planted around the source and basins, to enable the rehabilitation of 3 ha of soil and protect these vital infrastructures		
	Activities of Output 1.3	Means necessary	
	Seeding of one ha of Artemisia	Labor / soil preparation	
	Planting by propagation through cutting of 2 ha of rosemary and mastic trees (pistacia lentiscus – native shrub)	Seeding and propagation by cutting / protection	
	Planting of 2,000 prickly pear cacti		
	Output 1.4: The canalization system is restored and consolidated, in order to resist the impacts of climate change better, and to promote sustainable management of irrigated water / <u>PARTNERSHIP Direction Provinciale de l'Agriculture</u>		
	Activities of Output 1.4	Means necessary	
	Construction on 1.5 km of pipes	Coordination / Technical support Materials and tools Labor	

Outcome 2.0	Indicators	Sources of information and monitoring methods
<p>The community's capacity to adapt will be increased thanks to improvement of the local agroforestry, supported by a training and income-diversification programme</p>	<p><i>Nb of ha of land restored through fixation or soil conservation</i></p> <p><i>Population covered by awareness raising programmes regarding climate change, broken up by gender, and by age (at least 30% of the population in these programmes is women; at least 30% are young people under the age of 20)</i></p> <p><i>Nb of persons participating in capacity building activities (broken up by gender and by age (at least 30% of the population in these programmes is women; at least 30% are young people under the age of 20)</i></p> <p><i>Nb of households benefiting from higher incomes thanks to the project</i></p>	<p><i>Follow-up / Monitoring of the activities</i></p> <p><i>Reports on the activities and on training: Lists of attendance. Nb of participants in meetings, trainings, activities (numbers broken up according to gender and age)</i></p> <p><i>Photos / Testimony by community members</i></p> <p><i>Final participative evaluation / Workshops and individual discussions</i></p>
<p>Output 2.1. Resilient agroforestry species are planted to consolidate and fixate 100 ha of eroded soils</p>		
<p>Activities of Output 2.1</p>	<p>Means necessary</p>	
<p>Purchase and transportation of 8,000 olive tree plans (partnership with the Rural Commune)</p> <p>Site preparation / Digging the holes / Planting</p>	<p>Plants / Transportation</p> <p>Labor / Tools</p>	
<p>Purchase and transportation of 500 almond tree plants</p> <p>Site preparation / Digging the holes / Planting</p>	<p>Plants / Transportation</p> <p>Labor / Tools</p>	
<p>Purchase and transportation of 500 carob tree plants</p> <p>Site preparation / Digging the holes / Planting</p>	<p>Plants / Transportation</p> <p>Labor / Tools</p>	
<p>Output 2.2. Implementation of a community capacity building programme on agroforestry and conservative soil and water management as strategies to adapt to climate change</p>		
<p>Workshops to raise awareness on climate change and the fight against erosion (1 day, including ½ day for men and ½ day for women)</p>	<p>Facilitator /Meeting room</p> <p>Instructional material</p>	
<p>Practical training on agroforestry and conservative water and soil management (8 days distributed into 2 sessions – a total of 4 days for men and 4 days for women)</p>	<p>Facilitator /Meeting room</p> <p>Instructional material</p>	

	Visit of a conservation farming test site on a slope (Chefchaouen) – 1 day	Transportation of the participants Accommodations and meals
	Participation by community members in CBA	Transportation of the participants Accommodations and meals
	Output 2.3. Women's vulnerability is reduced, thanks to a training programme on Aromatic and Medicinal Plants, including the development of new income-generating activities	
	Activities of Output 3.2	Means necessary
	Training on the technical aspects of AMP, and introduction to the implementation of Income-Generating Activities from the AMP (2*3 days = 6 days)	Trainer Meeting room & Instructional material
	Visit of the female cooperative Bni Boufrah (province of Al Hoceima) – 1 day	Meals & Transportation of the participants

Outcome 3.0	Indicators	Sources of information and monitoring methods
<p>The lessons learned from the project are capitalized, promoted and disseminated in order to be incorporated into the local and regional policies, and reproduced at a larger scale.</p> <p><i>(Most of the activities from result 3 will be achieved in partnership with the TAFADNA association – Tizza CBA project)</i></p>	<p><i>Nb of young people and women involved in the project</i></p> <p><i>Nb of stakeholders (NGOs, local government, etc.) involved in the project and benefiting from training on managing the risks of CC and on planning</i></p> <p><i>Nb of communication products developed</i></p> <p><i>Nb of lessons capitalized and disseminated</i></p> <p><i>Nb of policies influenced</i></p>	<p><i>Reports on activities and meetings</i></p> <p><i>Personal accounts (interviews)</i></p> <p><i>Participative workshop / reports</i></p> <p><i>Discussions held during the workshops to promote the project</i></p> <p><i>Evaluation forms completed by workshop participants</i></p> <p><i>Products of communications conducted</i></p> <p><i>Evaluation</i></p> <p><i>Community Development Plan Documents</i></p>
<p>Output 3.1. The project's results are monitored and documented at all stages of implementation, with the involvement of local partners</p>		
<p>Activities of Output 3.1</p>	<p>Means necessary</p>	
<p>Monitoring of activities and documentation of the results / Local monitoring committee</p>	<p>Meeting room / Computer / Camera</p> <p>Material for mobilizing volunteers / Measuring material</p>	
<p>Steering committee & semi-annual meetings: with the Rural Commune, the CDP team, external services, and the TAFADNA association</p> <p><i>In partnership and co-financing with the TAFADNA association – Tizza CBA project</i></p>	<p>Meeting room / Transportation</p> <p>Coffee break</p>	
<p>Output 3.2 The project's results and evaluated, capitalized and disseminated</p>		
<p>Activities of Output 3.2</p>	<p>Means necessary</p>	
<p>Final participative evaluation</p> <p><i>In partnership and cofinancing with the TAFADNA association – Tizza CBA project</i></p>	<p>Consultant / Meeting room / Transportation</p> <p>Mobilization / Material / Food</p>	
<p>Production and dissemination of a KM product capitalizing the project's results</p> <p><i>In partnership and cofinancing with the TAFADNA association – Tizza CBA project</i></p>	<p>Report of evaluation / Graphic artist / Translator</p> <p>Printing and dissemination costs (500 copies)</p>	
<p>Organization of a final regional workshop to promote the project's results</p> <p><i>In partnership and cofinancing with the TAFADNA association – Tizza CBA project</i></p>	<p>Meeting room / Transportation / Food / Material and supplies</p> <p>Computer and projector</p>	

4.2 Schedule

		2011						2012											
		Jul	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Outcome 1: Strengthened ecosystem resiliency / water protection and conservation																			
Output 1.1	Water source development			■	■	■													
Output 1.2	Installation of 3 bassins			■	■	■													
Output 1.3	AMP planting			■	■														
Output 1.4	Canalization / seguia										■	■							
Outcome 2: Increased capacity to adapt / Agroforestry and capacity building																			
Output 2.1	Agroforestry and fruit tree planting				■	■				■	■								
Output 2.2	Climate Change Workshop	■																	
	Agroforestry training & Soil and water conservation					■				■									
	CBA training in Rabat				■														
	Visit of Chefchaouen pilot site	■																	
Output 2.3	AMP / income generating activities capacity building			■					■										
	Visit of Bni Boufrah cooperative	■																	
Outcome 3: Lessons learned are capitalized and promoted (coordination with TAFADNA)																			
Output 3.1	Monitoring of the activities	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	Steering committee with partners	■						■	■					■					■
Output 3.2	Final participative evaluation																■	■	■
	Support for capitalisation and promotion of the project results																■	■	■
	Final regional dissemination workshop																		■

4.3 Risks and Obstacles

Obstacles:

Potential obstacles that could hinder the project's implementation are as follows:

- The association leading the project is a commune-wide association, but not strictly speaking "community based." It must therefore gain the local population's trust and respect, which it has begun to do through the mobilization workshops organized during project development. To minimize this obstacle, the association will rely on a community organization that is unfortunately inactive, but whose capacities will have been improved by the end of the project.
- Within the community, there are certain tensions and disagreements regarding the management of water resources (with scarce resources and the deterioration of local living conditions, the ties of solidarity and collective work have been eroded, and replaced with individualism). The project will seek to restore the tradition of solidarity (Touiza) through activities essential to the population, and thanks to support from the local authorities and their power of mobilization (namely the President of the Commune)).
- Regarding the work of building the basins, establishment of the source and planting the AMP, we have targeted the most active people (men and women). Yet these active persons who showed they were motivated by the project's different activities often belong to those families who are the least well-off and work to provide for their families who lack financial means. Their participation in the project's works will prevent them from performing the daily work that usual allows them to earn income immediately. They will be motivated to participate in the construction work in return for a donation of carob and almond trees.
- In order to be mobilized, residents need to perceive their immediate **interest**. Efforts made to mobilize and raise participants' awareness must enable to promote the **project's benefits to the residents**: increased water availability, restoration of neglected lands, improvement of farm products, training, etc.
- There is also a cultural barrier to **women's participation**. Yet, they play an essential role in natural resources management and are extremely vulnerable to the impacts of climate change. They actually participated actively in the project development workshops. The association will encourage their concrete participation in all of the project's phases, through the following activities: women's integration in the project's pilot groups (empowerment and decision-making); women will have access to each training session and meeting, through sessions reserved for women, in appropriate locations and with female contributors. They will participate in all the activities and their participation will be valued. **Women's participation will also be ensured in the project's governance** and in decision-making, which will promote concrete mobilization of women for the activities and will be a factor of sustainability for the project.
- The capacity of assimilation of the target population that will benefit from training sessions and awareness raising represents a potential barrier that the project has to overcome. In fact, it can prove difficult to have the community understand climate change. This will be overcome by relying on unanticipated events and events already observed and by giving simple explanations to help the community become slowly aware of the scope of climate change and the importance of preserving the existing resources.

Risks:

- The local population's lack of involvement in the project's activities following a possible misunderstanding between the members of the community. The association leading the project is authentically certain that it can manage any risk related to community conflicts. The commune's president, who is very respected in the community, will be available to involve himself in the management and proper development of the project's activities.
- The climate uncertainties are likely to arise in the region. The occurrence of any natural catastrophe (flood, downpour) would block the project's activities from taking place. Development of the project has been marked by numerous climatic events (heat wave, sudden flooding) that have hindered the activities, including meetings and workshops.

4.4 Monitoring and Evaluation Plan

4.4.1 Initial VRA Analysis (Vulnerability Reduction Assessment)

The initial VRA was conducted at 2 community meetings held on May 28, 2010. These workshops were led by the ACCMA programme team, the CBA programme manager, and members of the association.

Because of the local cultural context, two separate workshops were organized for men and women. The women actually cannot participate in a workshop in the presence of men.

Men's workshop: Organized in the elementary school. 35 participants. Note: *The workshop was interrupted after question 3, because of a disagreement among the participants (this disagreement was clarified under the auspices of the President of the Rural Commune). The additional data was gathered by the Association throughout different subsequent meetings, particularly the one held on 22/04/2011 (project finalization).*

Women's workshop: Organized at the elementary school. 12 participants

VRA Score: 3.75 out of 10 (Moderate to strong vulnerability)

	Men	Women
Q1	2	2
Q2	2	2
Q3	2	2
Q4	6	10
<i>Total</i>	3	8
Average out of 10	3.5	4
Overall average	3.75	

VRA Form // MEN					
Indicator	Question	Score	Reasons for negative response	Reasons for positive response	How can this score be improved (solutions)
1. Vulnerability of the livelihood toward climate change and/or variability	What happens when there is a drought or strong rains? How does this affect your living conditions?	2/10	<ul style="list-style-type: none"> -The floods cause the village to be enclaved. When the oued's water level rises, access is blocked. -Our douar is surrounded by two rivers. During a rise in the water level, we are totally isolated for 4 months. -Difficult to obtain supplies of basic foods. -Flooding causes a lot of mud, which obstructs the seedlings. And since we do not have machines to work the soil, it is very difficult. -Because of drought, we have less water and farm production drops. -"It is normal to have droughts in the summer, but what is not normal is when it is supposed to rain normally, it does not." -"When there are rains, the water is lose because there is no system to collect and channel the water." 	//	<ul style="list-style-type: none"> -The source needs to be installed and irrigation channels need to be built to irrigate the fields. -The problem is that the floods take the canalizations away. -A basin is required to collect the water. -We would require a barrage. -We require a road in order to prevent from being blocked by the flooding.
2. Vulnerability of livelihoods to the growing / future risks of climate change	What would happen if droughts and strong rains were twice as frequent? How would you be affected?	2/10	<ul style="list-style-type: none"> The most serious for the future is the increase in droughts. -Diseases that affect crops and trees will develop. -Farm production will drop further. -During the 1980s, there was a lot of drought and production dropped a lot. -"Even if we install canalizations, if there is no water, there is no water." -We risk not having any more water for irrigation or for drinking. 	//	<ul style="list-style-type: none"> -We have to collect water when it rains and conserve it for the periods of drought. -Develop adapted cultures, trees in particular (olive, pomegranate, fig, carob) -Help farmers increase their production, to be able to sell part of it and raise their income. -Conduct a study in order to find the most suitable plants.
3. Magnitude of the barriers (institutional, political, technological, financial, etc.) to adaptation	With droughts / strong rains, what prevents you from adapting? What are the obstacles and what assets do you have in	2/10	<ul style="list-style-type: none"> -Lack of financial means -System of water right: there is no coordination for access to water -Lack of organization among the people. Each one looks to make his own profit. "This is what caused the failure to manage the old basin, which has been abandoned." -Dispersion of housing. "Some people will not benefit from the project. If the basin is 		<ul style="list-style-type: none"> -Find a manner to manage the basin collectively -Restore the old basin -Resume traditional collective management practices

	order to adapt?		installed in one neighborhood, the others won't accept it."		
Advantages/assets enjoyed by the community (volunteers, skills, commitment, local knowledge, community leadership, etc.)				-Existence of local savoir-faire and technical knowledge -Solidarity / touiza -There are canalizations installed, this is a base.	
4. Capacity and will of the community to continue to manage the risks of climate change	Do you think that with this project you will be able to acquire the means to adapt in the future? Are you going to continue the activities begun within the framework of this project?	6/10		We strongly believe that this project will allow us to improve our situation in order to face CC. There is a collective and individual commitment toward this project.	//
VRA Score		3.5/10			

VRA Form // WOMEN

<i>Indicator</i>	<i>Question</i>	<i>Score</i>	<i>Reasons for negative response</i>	<i>Reasons for positive response</i>	<i>How can this score be improved (solutions)</i>
1. Vulnerability of livelihoods toward climate change and/or variability	What happens when there is a drought or strong rains? How does this affect your living conditions?	2/10	-Floods have been destroying the canalizations -Because of flooding, we cannot leave the village for months. Sometimes, we cannot go to the souk (market) for three months. -Enclosure because there is no road. -Erosion, landslides -There are human damages and losses of animals -We are afraid that the houses will collapse due to flooding. -We must at times cross the overflowing waters and we catch gynecological illnesses because the water is polluted. -At times, women cannot even give birth because we cannot leave the village.		-We need to install access to drinking water -We need canalizations to hinder the strength of the rains -We must develop income –generating activities -We must protect the houses by adding a layer of cement.

			<ul style="list-style-type: none"> -We noted that there have been droughts because farming has dropped. -We are more affected than the men, because we are the ones that go fetch the water, and this has become more and more difficult. -The first problem is flooding -The second problem is drought -The third problem is erosion 		
2. Vulnerability of livelihoods to the growing / future risks of climate change	What would happen if droughts and strong rains were twice as frequent? How would you be affected?	2/10	<p>If there is twice as much strong rain:</p> <ul style="list-style-type: none"> -Houses will be destroyed -People will die -The village will disappear <p>If there is twice as much drought:</p> <ul style="list-style-type: none"> -There will be no longer farm production -Plants will dry out -Gardens will disappear -We will have to buy more water (water tanks), and people cannot afford it. They will become increasingly poorer. -The herds will disappear because there will no longer be any fodder. -Increased poverty, famine and malnutrition 	<p>“Still, drought is not as serious as flooding. Therefore, if we can manage to find a solution for the flooding, that will be already good.”</p>	<ul style="list-style-type: none"> -A bridge must be built -Canalizations are required to make water circulate in front of the houses -Gabions must be built to fight against erosion -Plants must be developed to fight against erosion and slow down the water -Women require access to education and training. “If I could speak to you directly, we would find more solutions.” -We must build a basin -We must protect the houses and make them more solid -We must store water reserves -We must cultivate plants that require less water
3. Magnitude of the barriers (institutional, political, technological, financial, etc.) to adaptation	What prevents you from implementing the solutions you are proposing? What are the obstacles and what assets do you have in order to adapt?	2/10	<ul style="list-style-type: none"> -Lack of financial means -Lack of physical strength (we cannot build gabions) -Lack of training and technical support for farming -We are illiterate 	//	<ul style="list-style-type: none"> -We have knowledge of agriculture, savoir-faire -Women are labor. We want to work. -We have already conducted activities in order to adapt: we have protected our homes against rain
Advantages/assets enjoyed by the community (volunteers, skills, commitment, local knowledge, community leadership,			//	<ul style="list-style-type: none"> -We require funding -Need for support and training -Develop income-generating activities, such as sewing and improved farming (cactus, olive oil) 	

etc.)				-We want a women's center to conduct activities together	
4. Capacity and will of the community to continue to manage the risks of climate change	Do you think that with this project you will be able to acquire the means to adapt in the future? Are you going to continue the activities begun within the framework of this project?	10/10	//	-If we do this project, we will protect all that we have built, therefore, we will be able to adapt better -We will have acquired a savoir-faire in farming -We will be properly trained -If we commit to this project, we will follow it to the end -We particularly want to be trained and work in farming. Men have to take care of the infrastructures. -"I own my land and want to offer it as a test site." -Others also want to make their parcel into a test site, but have to obtain their husband's permission	//
VRA Score		4/10			

4.4.2 Monitoring and Evaluation Plan for the Project

1. Monitoring of the Project

Progress reports to be presented every four months:

Production of a progress report regularly by the NGO : this report will present the state of the project's achievements and be produced by the NGO every four months. It will include a narrative report and financial report.

Monitoring of the community contribution:

For each of the project's activities, a table will indicate the names of the community participants / volunteers, their contribution and the number of days they have contributed.

Visits of the site:

The CBA will organize at least two visits to monitor and evaluate the project. These visits will coincide with workshops held to assess vulnerability.

2. Project Evaluation

Internal Evaluation:

The association will conduct regular participative evaluations of the project (every 6 months). These evaluations will be conducted by the NGO and will involve the communities and local actors concerned. They will consist in the following:

- Assess the degree of achievement of the project's activities (tool to be used: schedule of the project's activities)
- Assess how results and impact indicators will have been reached (tool to be used: project's logical framework)
- Identify limitations and define measures to be undertaken to overcome them
- Gather the advice and recommendations of the local community/actors in order to readjust the project

These evaluations will be conducted through enlarged meetings with the community and visits in the field. At the end of these evaluations, the NGO will produce a brief illustrated report.

Final External Evaluation:

This evaluation will be conducted in a participative manner by a consultant whom the NGO will hire (based on an invitation to bid).

It will rely on community evaluation reports and its goal will be to evaluate the following :

- The project's achievements
- The measurement of indicators
- The degree to which the project's goals have been achieved
- The project's impact on the community (socioeconomic and environmental) based on the indicators defined below
- The project's sustainability
- The crucial evaluation of community adaptation solutions and possibilities of replication / dissemination of the experience

The external evaluation will enable to draw the following:

- The project's strengths and weaknesses
- Lessons learned and recommendations

List of Indicators Being Subject to Monitoring & Evaluation

The project coordination team will be monitoring the project's activities **continuously**, according to indicators included in the logical framework.

The following groups of indicators will be monitored : Vulnerability Reduction Assessment, the Impacts Evaluation System (IES) and adaptation indicators.

Measurement of the Vulnerability Reduction Assessment

	Approximate planning of VRA sessions	Who organized / will organize the VRA meeting	Who will be responsible for collecting VRA data
Initial	May 2010	CBA programme manager and consultants	CBA programme manager and consultants
Second / mid-course	February 2012	Association (CBA programme support)	Association
Final	November 2012	Association (evaluating consultant support)	Association

Measurement of Impact Indicators (IES)

(General Environmental Benefits + Living Conditions and Capacity Building)

IES Indicator to be measured	How will it be measured	When will it be measured	Target value to be achieved at the end of the project	Who will measure the indicators
Nb of ha of lands restored by fixation or conservation	Measure the nb of ha of lands restored Reports of the project's activities / Photos Final evaluation of the project	Activity Reports every 4 months + Final evaluation	At least 10 ha of degraded lands are restored sustainably	Association, with Rural Commune support + Consultant (final evaluation)
Volume of erosion avoided thanks to water retention and soil fixation	Measurement of surface affected by erosion around the source and basins and estimation of erosion volume. Photos / Measurements Final evaluation	Activity Reports every 4 months + Final evaluation	At least -30% of erosion avoided	Association, with Rural Commune support + Consultant (final evaluation)
Retention and conservation of water resources	Water reserves are protected and secured thanks to the source's restoration Monitoring of basin restoration / documentation (photos, measurements) Calculation of quantity of water	Weekly measurement of water contained in the basins and creation of a water retention schedule Activity Reports every 4 months + Final	3 basins are restored, securing 500 m ³ of retention water Retention quantity and time increases by at least 20%	Association, with Rural Commune support + Consultant (final evaluation)

	collected and time of retention Volume of irrigation water managed conservatively	evaluation		
Nb of persons benefiting from capacity building	Training reports, attendance lists Reports of activities Testimony / discussions	After each activity Activity Reports every 4 months + Final evaluation	At least 100 people At least 30% of participants are women; 30% are young people under the age of 20	Association, with Rural Commune support + Consultant (final evaluation)
Number of young people and women having participated actively in the project (capacity building indicator)	Reports of activities Testimony / discussions	After each activity Activity Reports every 4 months + Final evaluation	At least 30% of participants are women; 30% are young people under the age of 20	Association, with Rural Commune support + Consultant (final evaluation)
Reduced vulnerability of women through the easing of their water chore	Discussions / testimony Measurement of daily activities	Activity Reports every 4 months + Final evaluation	At least 30 women reduce their water chore by 1/3	Association, with Rural Commune support + Consultant (final evaluation)
Nb of communication products developed	Reports of activities Final evaluation	Activity Reports every 4 months + Final evaluation	At least 1 product	Association, with Rural Commune support + Consultant (final evaluation)
Nb of lessons learned and disseminated	Reports of activities Reports of Steering Committee meetings Communication products dissemination plan Final evaluation	Activity Reports every 4 months + Final evaluation	At least 2 lessons	Association, with Rural Commune support + Consultant (final evaluation)
Nb of policies influenced	Reports of activities Reports of Steering Committee meetings Final evaluation Individual discussions with partners Final workshop report	Activity Reports every 4 months + Final evaluation	At least 1 policy influenced	Association, with Rural Commune support + Consultant (final evaluation)

Measurement of Adaptation Indicators

Adaptation Indicators	How will they be measured?	When will they be measured?	Target value at the end of the project	Who will measure?
Project zone population covered by programmes to raise awareness on climate change	Reports of activities / Participation in project activities = meetings, trainings, concrete activities (gender disaggregated data)	After each activity Quarterly reports + Final evaluation	At least 150 persons are covered	Association, with Rural Commune support + Consultant (final evaluation)
Success of the sustainable resources management interventions to improve living conditions	Final evaluation Testimony	Continuous monitoring + Final evaluation	At least 50% of households that participated in the project have expressed that their living conditions have improved At least 10 new households are motivated in participating in future activities, given the project's success.	Consultant (final evaluation)
Nb of actors (NGOs, groups, etc.) involved in the project and trained for management of climate risks and planning in this area	Participation in workshops / Reports Individual discussions	Quarterly reports + Final evaluation	At least 2 NGOs, 1 local government, 3 local and regional partners are committed	Association, with Rural Commune support + Consultant (final evaluation)

4.5 Project management

4.5.1 – Management Structures

Regular Monitoring by a Local Committee

At the community level, a local monitoring committee will be established. This committee will be comprised of community members (community volunteers, project participants) and members of the association leading the project, and the Boumaad village association. This committee will guarantee **gender representation** during monitoring of the project (**at least 2 women will participate in this committee and represent the women of the village**).

This monitoring committee will organize a **meeting each month to monitor and plan the conduct of project activities**, diagnose possible problems and suggest readjustment, and organize the participants' work.

The participants will produce and sign reports of these meetings and attach them to the reports of activities.

This committee will be comprised of 8 members (including 1 member of the Fouss G Fouss association, 2 members of the Boumaad association, 1 engineer from the Rural Commune, 2 men and 2 women from the community), who will share the following roles :

- Coordination of the project
- "Gender " focal point
- Financial management and financial reports
- Responsibility for writing reports of activities
- One leader for each activity (organization of work groups)

Management by a Committee Associating the Project Partners:

- **1 Meeting every 6 months to define the plan of action** for the project during the semester, based on the project's overall calendar, and **to evaluate the achievements.**
- This **steering committee is common for both CBA projects in the Rural Commune of Boudinar**, whose implementation is being closely coordinated.
- Participating in this committee : the two TAFADNA and FOUSS G FOUSS associations, the President of the RC of Boudinar, the CBA programme, and associated external services.

A total of 4 steering committee meetings will be organized, jointly with both projects – TAFADNA (Tizza) and FOUSS G FOUSS (Boumaad). Each of these 2 associations will organize 2 meetings.

Participants will produce and sign reports of these meetings and attach them to the reports of activities.

4.5.2 – Relationship Between the Project Leader and Its Partners

Each quarter, the project leader is responsible for mobilizing partners for the project's **Steering Committee** meeting (see above).

This steering committee is common to both CBA projects taking place in the Rural Commune of Boudinar, and whose implementation is being closely coordinated. **Both associations are committed to working together** in order to achieve their respective projects, which should produce results overall for the Commune.

The **Rural Commune of Boudinar** will provide permanent support to both associations for the implementation of their project (reporting, financial management, organization of the activities).

The **CBA Programme** team will provide support for the implementation, monitoring, reporting, capitalization and sharing of lessons, as well as the inclusive mobilization of the communities. The team will help to prepare the Terms or Reference for the Consultations, Trainings and Workshops. At least two missions will be conducted in the field within the project's framework, and a national CBA workshop will be organized in Rabat.

5.0 PROJECT BUDGET AND FUNDING PLAN

		Budget Line	Nb of units	Unit Cost (MAD)	Total (MAD)	Amount solicited from the CBA	Community Contribution	Rural Commune's Contribution
						In cash	In kind	In kind
Outcome 1	The resiliency of the ecosystem is strengthened thanks to the implementation of a strategy of water resources protection and conservation							
	Output 1.1	Access to drinking water is secured through the restoration and protection of the village's only source of water						
		Completion of 5 small walls in dry stone						
		Material /Tools / Specialized labor	1,00	20 000,00	20 000,00	20 000,00		
		Technical support and guidance	5 days	2 000,00	10 000,00	10 000,00		
		Installation of platform to access the source						
		Collection and transportation of local materials	1,00	10 000,00	10 000,00	10 000,00		
		Specialized technical support	2 days	1 500,00	3 000,00	3 000,00		
		Community labor (10 pers)	10 days	70,00	7 000,00		7 000,00	
	Output 1.2	Installation of 3 basins to preserve rainwater and run-off: 1 basin is restored and strengthened; 2 new basins are created						
		Cleaning the basins	3 days	70,00	4 200,00		4 200,00	
		Installation of the basins (digging the basin, with a descending slope heading from uphill, installation of the bottom of the basins (flat slabs), construction of low stone walls downhill)	3,00	15 000,00	45 000,00	45 000,00		
		Tractor & mechanical shovel rental / Transportation of materials						
		Labor (20 pers)	17 days	70,00	23 800,00		23 800,00	
	Output 1.3	Aromatic and medicinal plants are seeded and/or planted around the source and basins, to enable the rehabilitation of 3 ha of soil and protect these vital infrastructures						
		Preparation of soil & Implementation	10 days	70,00	7 000,00		7 000,00	
		Purchase of seeds and plants						
		Sowing of Artemisia + Rosemary and Mastic tree plants	1,00	9 000,00	9 000,00	9 000,00		
		Cactus / Prickly pear	2 000,00	3,00	6 000,00	6 000,00		
	Output 1.3	The canalization system is restored and strengthened to make it more resistant to the impacts of climate change, and to promote sustainable management of						
		Construction of 1.5km of canalization	1,00	150 000,00	150 000,00			
		Construction material and implementation						

Outcome 2	The community's capacity to adapt is increased thanks to improved local agroforestry, supported by a training and income diversification programme								
Output 2.1	Resilient agroforestry species are planted to consolidate and fixate 100 ha of eroded soil								
	Plantation of 10,000 olive trees	Purchase & transportation of plants	10 000,00	16,00	160 000,00				160 000,00
	Plantation of 500 almond trees	Purchase & transportation of plants	500,00	16,00	8 000,00	8 000,00			
	Plantation of 500 carobtrees	Purchase & transportation of plants	500,00	16,00	8 000,00	8 000,00			
	Realization	Community labor (20 persons)	15 days	70,00	21 000,00			21 000,00	
Output 2.2	A community capacity building programme is implemented, on agroforestry and conservative soil management as strategies to adapt to climate change								
	Awareness raising to climate change (1 day)	Trainer / Consultant	1 day	2 500,00	2 500,00	2 500,00			
		Meeting room	1 day	200,00	200,00			200,00	
	Practical training on Agroforestry and Conservative water and soil management (8 days)	Trainer	8 days	2 500,00	20 000,00	20 000,00			
	Visit of conservational sloping farming site in Chefchaouen	Transportation and accommodation for community representatives (20 pers)	1 day	100,00	2 000,00	2 000,00			
	Participation in CBA trainings	Transportation and accommodation for community representatives (3 pers.*5 days)	5 days	400,00	6 000,00	6 000,00			
Output 2.3	Women's vulnerability is reduced, thanks to a training programme on the production of Aromatic and Medicinal Plants, including the development of new income-generating activities								
	Technical training on the production of AMP and introduction of the establishment of Income-Generating Activities deriving from AMP (2*3 days = 6 days)	Trainer	6 days	2 500,00	15 000,00	15 000,00			
		Meeting room	1 day	200,00	200,00			200,00	
	Visit of the female cooperative of Bni Boufrah (Al Hoceima province) – 1 day	Transportation and accommodation for the participants (10 women)	1 day	100,00	1 000,00	1 000,00			

Outcome 3	The lessons learned from the project are capitalized, promoted and disseminated in order to be incorporated in the local and regional policies, and for larger scale replication.								
Output 3.1	The project's results are monitored and documented as the project is being implemented, with the involvement of local partners								
	Monitoring / Documentation of the project	Camera + memory card	1,00	2 500,00	2 500,00	2 500,00			
	Steering Committee (Quarterly) 2 meetings conducted by Fouss G Fouss / 2 meetings conducted by	Coffee break	2 meetings	200,00	400,00	400,00		3 000,00	3 000,00
		Meeting room	2 meetings	200,00	400,00		400,00		
Output 3.2	The project's results are evaluated, capitalized and disseminated to be replicated on a larger scale (in partnership with TAFADNA / shared								
	Final participative evaluation	Consultant	4 days	2 500,00	10 000,00	10 000,00			
		Meeting room	2 days	200,00	400,00		400,00		
	Achievement and dissemination of KM product	Conception and realization	1 budget global	5 000,00	5 000,00	5 000,00			
	Organization of 1 regional workshop	Meeting room for the Municipal Council	1 day	1 000,00	1 000,00			1 000,00	
		Coffee and lunch break (50 people)	50 pers.	50,00	2 500,00	2 500,00			
		Material / Supplies / Files	Global budget	500,00	500,00	500,00			
		Projector and computer	2 days	500,00	1 000,00			1 000,00	
	TOTAL BUDGET FOR THE ACTIVITES (MAD)				562 600,00	186 400,00			
		<i>Provision for unforeseen events (1% of the CBA contribution) - MAD</i>					1 864,00		
		<i>Administrative expenses / management (including translation of reports, etc). 7% of CBA contribution - MAD</i>					13 048,00		
	TOTAL BUDGET AND CONTRIBUTIONS (MAD)				577 512,00	201 312,00	64 200,00	165 000,00	153 000,00
	TOTAL BUDGET AND CONTRIBUTIONS (USD)				72 734,51	25 354,16	8 085,64	20 780,86	19 269,52
	<i>% of total budget</i>				<i>100,00</i>	<i>34,86</i>	<i>11,12</i>	<i>28,57</i>	<i>26,49</i>
	Exchange rate USD (June 2011)		7,94						

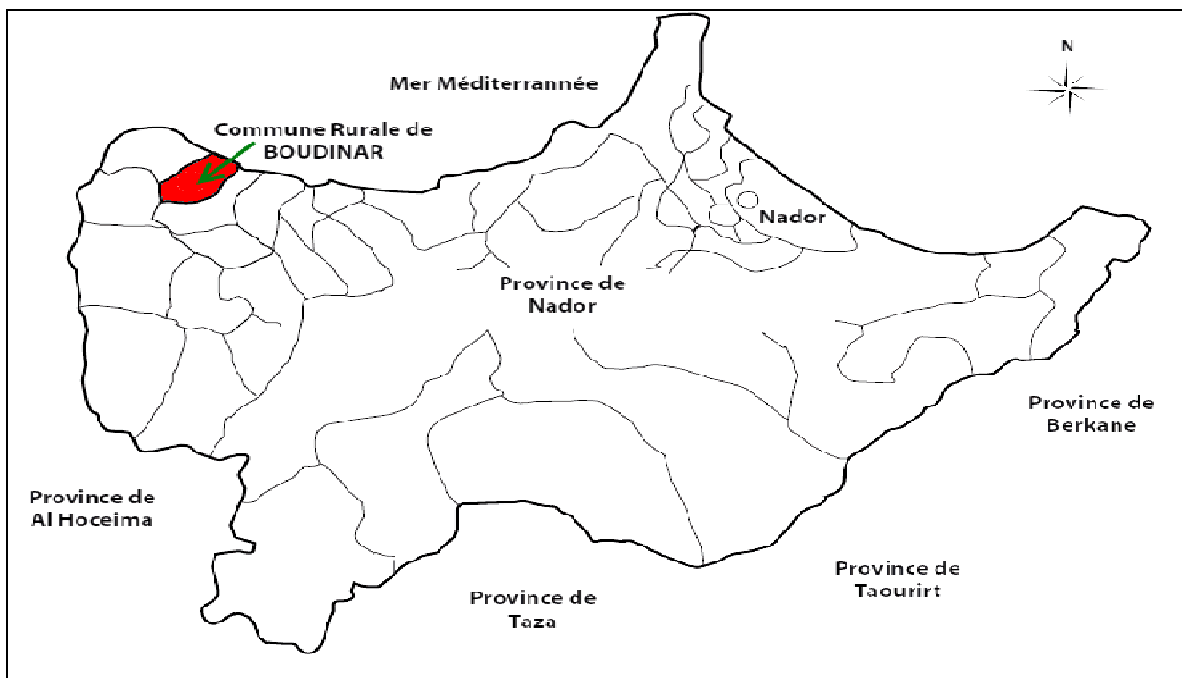
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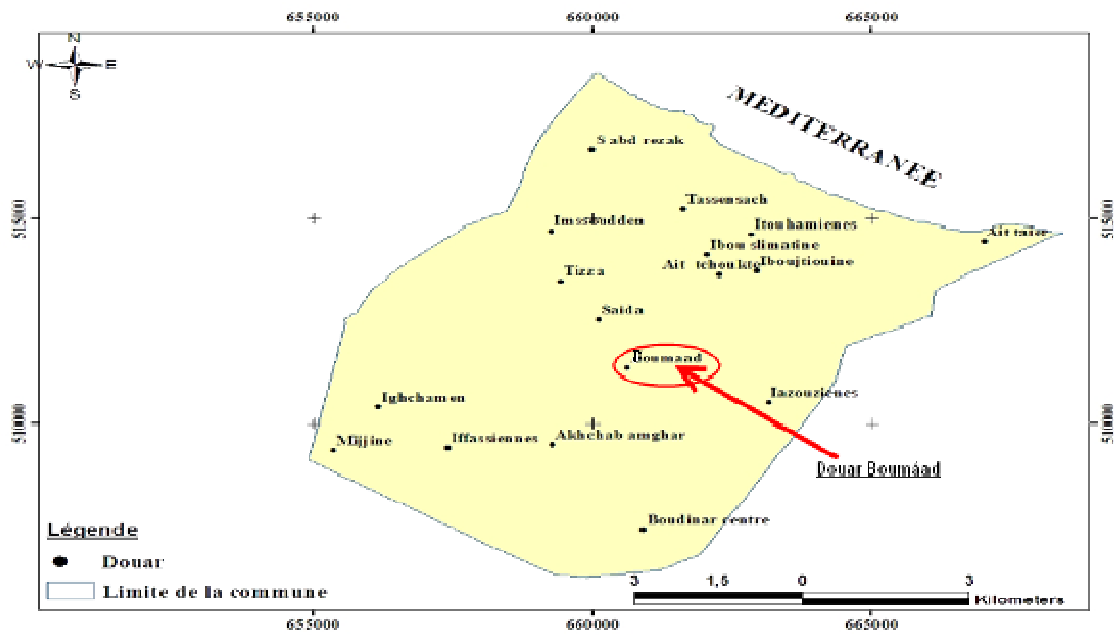
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List of Annexes (documents prepared by Manar MATAH, Consultant)

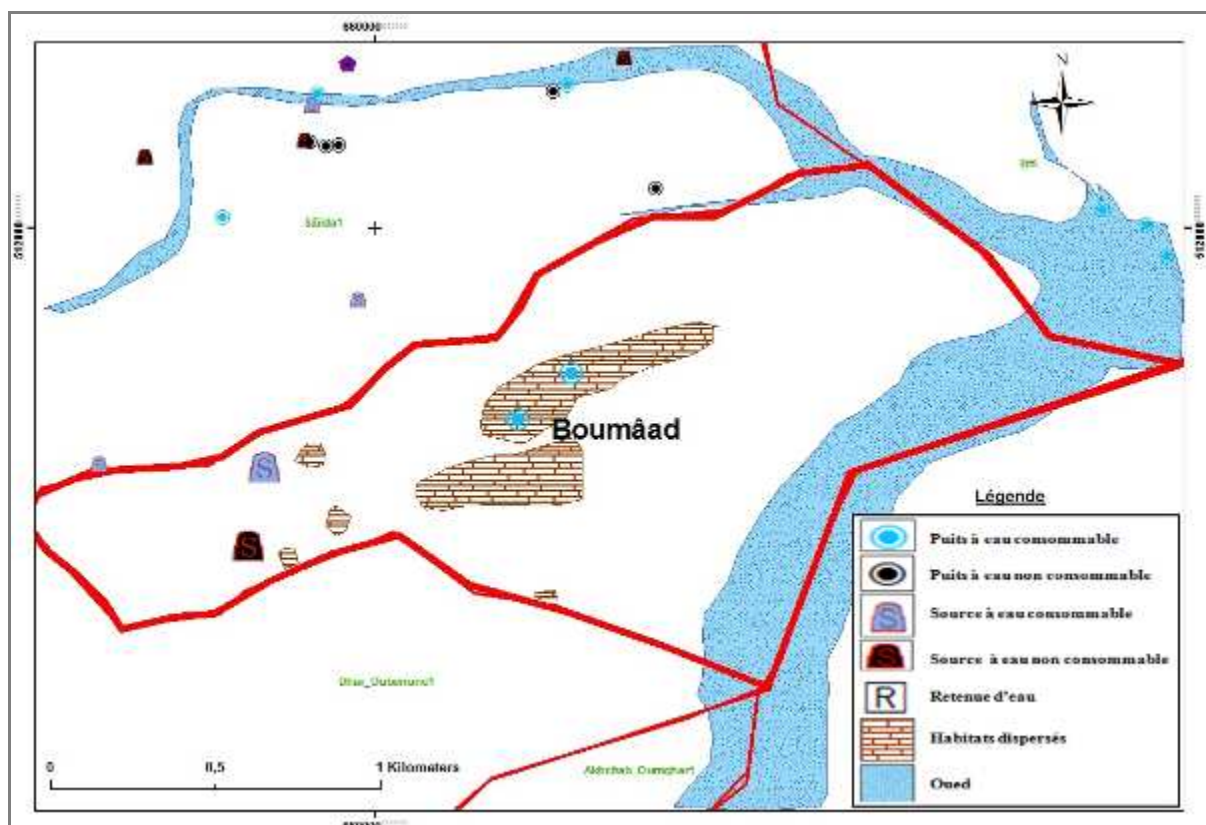
- 1- Location of the Rural Commune of Boudinar on Morocco's eastern Mediterranean Region
- 2- Location of the water supply points and douar housing
- 3- Fact sheet on the construction of basins for water collection
- 4- Fact sheet on the water source restoration
- 5- Fact sheet on AMP planting
- 6- Fact sheet on resilient plants
- 7- **Letters of cofinancing by partners: DPA and Rural Commune of Boudinar**

Annex 1
Location of the Rural Commune of Boudinar on Morocco's eastern Mediterranean Region





Location of the Boumaad douar in the Rural Commune of Boudinar



Annex 2

Location of the water supply points and douar housing

The population does not take the water from the wells that are listed as drinkable water sources into consideration. Very few people drink it because of lack of means to go and collect the water from the source.



Views in the village



Trail to the water source



Section of the Seguia (irrigation canal)



Old basin to be restored



Carob tree in Boumaad

Annex 3

Fact sheet on the construction of basins for water collection

Justification for the construction of the basins

Water holds an important place in the daily life of the village population. The latter has been facing various problems linked to the lack of control over this resource. Women and young girls cover long distances to obtain the water needed to perform the different domestic duties.

The goal of producing reservoirs to collect rainwater is to make the water that can serve for various uses at the disposal of the local population, particularly women.

Importance of Collecting Water

Collecting rainwater has been practiced for thousands of years, particularly in arid and semi-arid regions. Rainwater is more particularly used to irrigate crops and for various domestic uses such as laundry, and it can also serve for annual consumption, for example.

Climate has a significant impact on the collection of rainwater: we have been currently witnessing a general global warming trend and rarer and often very violent rains, an occurrence also heightened by disappearance of the vegetation cover.

In certain arid or semi-arid countries, rains that fall during the rainy season (generally four months, from November to February) are no longer enough to supply the water tables and wells. When the dry season arrives, reserves are therefore quickly exhausted.

Planning and Achievement

During the project's development, it has been essential to take the local population's perceptions and preferences into consideration, instead of imposing solutions on it. This is why we have consulted the beneficiary community to plan and build the water reservoirs.

The residents of the Boumaad douar have recommended the building of 3 reservoirs in each of the three sections comprising their village. They have been motivated by this action, which will be very useful to them and meet their needs, particularly during the dry periods.

The sites they have recommended are known for their capacity to harness rainwater through run-off.

Creation of the basins will involve the population that is directly concerned. In fact, it is the different beneficiaries themselves who will participate in the construction (in exchange for acquiring carob or almond tree plants).

Once this is achieved, the water collection systems must often be inspected, especially during the first rainy season. The population should be sufficiently aware of the importance of such work through training on the importance of water management.

Technical Details:

- Size: 10 x 10 m x 1 m in depth
- Create a descending slope from the upstream direction
- Build small walls downstream to minimize the flow and improve the basin's capacity to retain water
- In order to reduce evapotranspiration: planting around the basins + cover
- To slow down infiltration while preserving soil permeability, stones will be placed at the bottom of the basins

Means Necessary:

- Tractors / mechanical shovel
- Stones and transportation
- Labor to build the low walls
- Protection plants
- Low stone wall (use of the stone and earth removed from the holes from digging)
- Cover / Sheet + fastener/stakes + ropes

Products:

- Restoration of the basin located in 'AGHBAL' with an area of 10*10 m (photo1).



Photo 1: Water collecting basin in AGBAL Boumâad douar

This old basin harnesses large quantities of rainwater. The local population tried to dig a common well at the same location, but it did not find any water and abandoned the operation. Since then, this basin, which was originally created naturally by run-off water, no longer harnesses significant quantities of rainwater.

“We showed you the situation, but we do not know what to do. Even if water is harnessed, it is rapidly polluted and cannot be used.”

- Construction of a basin in 'OUFOU' of an area measuring 10m*10m (photo2). This basin's location will be in a location known for rainwater harnessing. This location is currently occupied by polluted brackish water.



Photo 2: Water collecting basin in OUFOU, Boumâad douar (in winter)

- Restoration of a very old basin located at “Dhar Boumâad” with an area measuring 10m*10m. This old basin harnesses only very small quantities of water that immediately becomes polluted. The population in this portion of the douar no longer uses this basin’s location.

Restoration and construction of the basins consists of cleaning them, deepening them and consolidating the edges to reduce losses of water and thus increase the basin’s capacity to store rainwater.

Estimated budget: 15,000 DH

Annex 4

Fact Sheet on Water Source Restoration

Justification for Restoring the Water Source

Water represents the most essential need for the Boumaad community. The village has not been able to benefit from a supply of drinking water and climate change has considerably increased the water shortage for the local population. Women and young girls are forced to cover long distances in search of the only source of water to supply the douar with drinking water.

For this source, two outlets have been set up. The first one contains 3 water pipes (Photo 1), the second (Photo 2) contains 4 water pipes that no longer function.



Photo 1



Photo 2

This source is located at the foot of the mountain and the landscape overlooking it (Photos 3) presents the strong likelihood that it will erode with mass movements (landslides), which make the source very vulnerable.



Photo 3

Restoring the source will allow the community to obtain water in a sustainable manner, especially during periods of drought, and to avoid situations of social tension generated often by the water crisis.

Restoring the water outlets will enable to lighten the chore of collecting drinking water for women, who will no longer have to wait long for their turns in front of the source during the dry periods.

Protecting the source will enable to ensure a sustainable flow of water through the canalization and thus will help farmers obtain irrigation water more easily.

Planning and Achievement

The significance of the source for the village community does not need to be demonstrated, and its restoration has represented the principal preoccupation for the douar residents. During the development of the project proposal, community members (men and women), with whom we consulted on different activities within the project, clearly agreed on restoring the water source in order to protect it. Furthermore, this activity has been the means to motivate the community to become involved in the project's implementation.

Restoring the water source consists of the following:

- Establishing an anti-erosion system (net + plant system) to maintain the soil of the landscape, which overlooks the source, and protect it from landslides after heavy rains.

Planting consists of introducing AMP, which is an activity the community really wants to take part in. It must therefore be made a priority and use it as much as possible to have people participate, especially women. Planting aromatic and medicinal plants – take advantage of this platform around the source to gather women, train them and raise their awareness. This activity will be the base of the community mobilization.

The importance of planting AMP resides in the fact that it will enable in the medium and long terms to reduce soil erosion and the gulying process, stabilize the area overlooking the source, improve biodiversity and thus soften the negative impacts of climate uncertainty on the water source and therefore on the living conditions of the local population.

The different species of AMP that will be planted are the subject of another fact sheet.

- Restoring the platform around the source, with durable materials (stones + wood).

Technical Details:

- Protection: net measuring 100 m x 100 m upstream (specialized company)
- Plants: above the source : AMP for soil fixation : Rosemary, Artemisia, Pennyroyal.
- Improvement of the platform around the source : stone, wood (10 m x 10 m)

Means Necessary :

- Net measuring 100 m x 100 m upstream to protect the source
- Specialized labor to implement the protection system
- AMP plants to fixate the soil
- Labor to plant the AMP
- Stones and wood (10 m x 10 m)
- Labor to improve the platform

Estimated Budget:

Protection: 20,000 DH

Improvement of the platform: 10,000 DH

Planting of the AMP: 15,000 DH

Total: 45,000 DH

Annex 5

Fact Sheet on Planting Aromatic & Medicinal Plants

➤ **Methodological Approach:**

- A group of women who would be motivated will protect the AMP introduced on the platforms
- Organization of training sessions on the technical process
- Organization of demonstration and awareness-raising workshops for the douar women
- Visits of the AMP women's cooperatives (the Bni Boufrah cooperative in the province of EL HOCEIMA produces derivatives of aromatic and medicinal plants. It manages the production, management and marketing of plants traditionally used by Moroccan women).
- Dissemination of lessons learned to other farmers through days of training and capacity building, using adequate facilitating techniques.

➤ **Importance of introducing AMP in the douar:**

AMP represent a source of heat energy for the homes, fodder for the herds, nectar for the bees, remedies against illnesses, and especially an opportunity to increase family incomes.

AMP are a source of nectar for bees. The honey produced from them is very appreciated by consumers and is considered as very good quality and of a significant therapeutic value. As such, this activity can improve the income of the population involved in beekeeping.

AMP can represent a precious fodder resource for breeders, which could have a favorable impact on the quality of meat. The availability of this resource will lighten the duty of gathering the fodder, which falls exclusively onto women.

Similarly, if there is no tree cover, the douar population can rely on wood deriving from dead clumps of AMP for their supply of wood fuel, which is used mainly to heat the homes and warm up food.

Rosemary: *Rosmarinus officinalis*

➤ **Description and Ecology**

Rosemary, *Rosmarinus officinalis* L., is an ornamental, aromatic and medicinal plant, known in Morocco by the vernacular name "Yazir" or "Iklil al jabal" in classical Arabic.

It is a shrub that can reach 1.5 m high and 1 m in diameter. It grows in forests, the brush and matorrals of the plains and low and medium mountains of the central and eastern Rif, eastern Atlas and eastern high Atlas, on limestone substratum and in the series of thermo and meso-Mediterranean vegetation, in a semi arid and sub-humid bioclimatic climate.

Rosemary is generally a species that grows in arid to sub-humid (hot to cool) zones. It prefers carbonated and well-drained soils. It is indifferent to the soil's chemical quality.

This species vegetates under precipitations ranging from 199 mm to 490 mm, and supports temperatures varying between -1,9°C and 39°C.

➤ **Areas Where Rosemary Can Be Used**

The use of this plant encompasses very vast and varied areas, from traditional pharmacopeia to the most complex industries in the field of pharmaceutical products, agri-food, cosmetics, etc.

Rosemary is used as follows:

- It is frequently cultivated in gardens for embellishment and used as a condiment
- Antioxidant in the industry producing meat-based products
- In the perfume industry as a component in most eau de Cologne and soaps
- In the pharmaceutical and therapeutic industry, rosemary essential oils with cineole and α -pinene and are used as a raw material for the preparation of certain medications and in aromatherapy.
- The rosemary essential oil is used as a stimulant for the scalp, an antiseptic, healing substance, antiparasitic, and to prevent hair loss.
- An infusion of the leaves is used as an aperitif, cholagogue and stomachic. But especially as an emmenagogue. Powder from the leaves is lightly sprinkled as a healing substance and antiseptic after circumcision.

➤ **Cultivating Rosemary**

Rosemary thrives in full sunlight in soil with a pH between 6 and 7.5 light, well drained, but not too humid.

Sowing: Possible from April to May, taking of branch cuttings from 15 to 20 cm in September or March / April is preferred.

Spacing measures 0.70 cm in the row and 1.5 to 2 m. This corresponds to a density of 8,000 plants/ha.

Rosemary is transplanted with difficulty. It needs to be sowed pots with peat in a sand/pro-mix blend, in January or February. This operation consists of planting the seeds at 1 cm. they need darkness in order to sprout. Germination takes 3 to 4 weeks at a temperature between 20 and 25 degrees Celsius.

Care: watering without excess during recovery, light watering when the earth is dry after.

Harvest: leaves can be cut at all times and used fresh or be dried and preserved in a tightly sealed jar.

Artemisia: Artemisia herba alba

➤ **Description and Ecology**

Artemisia is a perennial plant with a woody, creeping and fibrous root. The stem, which can reach up to 1.5 m, is herbaceous, cylindrical, striated, reddish, a little hairy, upright and branchy. The leaves alternate, are deeply lanceolate, cut into segments with dark green on the top and white and downy underneath. The yellow flowers are grouped into small capitulums and arranged into small axillary tufts that join together in a long panicle. The fruit is oval and smooth.

The most significant plantings of this species are found in arid and semi-arid bioclimatic zones. They grow in various types of soils are very calcareous and avoid areas where rainwater accumulates and stagnates.

➤ **Traditional Uses:**

It is prescribed as a vermifuge, emmenagogue, diuretic, stomachic, intestinal antiseptic, tonic depurative, cholagogue and antidiabetic. This species, mixed with other plants and spices, is used to prepare broths considered as a preventive and curative remedy against all cold season illnesses.

The essential oil contained in the Artemisia leaf has menstrual cycle and period regulating properties. The plant will be recommended for women presenting an irregular cycle and also in case of absent or light periods.

Another interesting property – Artemisia is antispasmodic and effectively calms abdominal pain that can occur during periods.

➤ **Cultivation**

Artemisia is found abundantly in a wild state, preferring light soils and uncovered exposure in spite of everything. To cultivate it, just sow the seeds in the spring and prick out the plants as soon as they are strong enough, at a 60 cm distance one from the other approximately. Another method simply consists of dividing the tufts in the spring. The flowered heads can be cut as soon as flowers appear, in June and July. The plants are cut at 30 to 40 cm from the top, and arranged into suspended bouquets that are dried in an airy location.

Estimated Budget

The establishment of one hectare of AMP will require approximately 10 people to prepare the soil, seeds and irrigation. The estimated budget is approximately 15,000 DH.

Annex 6

Fact Sheet on Resilient Plants

Justification for Planting Fruit Trees

The village of Boumâad has been experiencing a deterioration of its forest ecosystem at the Dhar Ouberran forest, and also with regard to tree cultivation. The latter are not spread in the same manner as before and certain crops have been abandoned because of climatic conditions that hinder their development. The reduced practice of tree cultivation has been a direct impact of the different climatic uncertainties that have appeared in the zone, such as floods, downpours and recurrent droughts.

Similarly, these climatic occurrences have not spared the soils and farm lands, which have considerably deteriorated, and therefore no longer allow for the development of certain crops that are not very demanding.

The impact of this deterioration of the farm sector has affected the local population's means of existence, causing its financial resources to decrease.

Planting resilient species of fruit trees in bare zones will ensure protection of the soil, curb accelerating erosion, restore vegetation cover in the region, and increase the local population's income.

The resilient species recommended by farmers for the douar are the carob, almond and olive trees.

The Carob Tree (*Ceratonia siliqua*)

➤ **Adaptation Qualities**

The carob tree (*Ceratonia siliqua*) is a typically Mediterranean tree that is quite common throughout Morocco. It is an agro-sylvo-pastoral species that represents huge socioeconomic and ecological interests. Thanks to its ability to develop different adaptation strategies to the water constraints, this tree easily survives in arid and semi-arid zones.

It is an essence, very malleable, heliophilic, thermophilic, very resistant to drought (200 mm of rain), but not to cold.

Carob trees easily tolerate a poor and stony soil, and exposure to full or medium light.

The trees begin to produce pods from the age of 6.

Production increases gradually with age and stabilizes at 40-50 years of age. It is insignificant until the age of 7, from 10 to 40 kg/tree until age 20, 50 to 80 kg until age 30, 60 to 120 until age 40 and reaches 100 to 200 kg/tree from the age of 50.

➤ **Cultivation Techniques**

Soil Restoration

Successful planting requires meticulous preparation of the soil. Planting holes measuring 60x60x60 cm must be prepared before planting. In arid zones, it is recommended to prepare basins around the foot and furrows in a V above, in order to collect the rainwater.

Planting generally occurs in February and March. Plants must be at least two years old. Watering is necessary during transplanting and the first two summers.

Density

In modern planting, distances of 8x9m to 6x8m, are used; 6m between trees and 8m between the lines, which allows for approximately 200 trees per hectare. The density depends on the availability of water and form of the tree, which varies a lot according to the clones. Whatever the geometric figure used, one must not lose sight of the need to incorporate a proportion of at least 10% of male or hermaphroditic feet to the planting that will be distributed in order to ensure greater pollination of the female trees.

Fertilization

For the young trees, the recommended doses of fertilizer in irrigation water are 100-150 mg/l of N, 70 mg/l of phosphates and 100-150 mg/l of potassium. For adult trees 15-20 years old, the maximum dose of nitrogen must not surpass 1kg/tree/year.

Pruning

Pruning is necessary to give the tree the most appropriate shape for its vegetative balance. It is an effective manner of regulating its fructification and conforms to its productive capacities. The first pruning is done to give the tree the form of a vase, and the second to shorten the axes taken or lateral branches that are too long, remove the ones that consume too much or that are troublesome. The best season to prune is in the fall, after the fruits are harvested.

In April and May, pinching is conducted in order to regulate the tree's vegetation in general and speed up the fructification of young plants. Pruning is conducted every three to four years.

Thinning out

The carob is a tree that rejects a stump that gives many strands per shoot. The competition between the numerous strands delays their growth significantly, and fructification as a consequence. To speed up fructification, thinning the carob tree is required.

➤ **Potential for Development**

Carob trees represent a growing interest not only because of their hardiness, indifference regarding the nature of the soil, the quality of their wood, their ornamental and landscaping value, but also and especially because of their seeds, which are used for business transactions and whose value surpasses by far that of wood production.

The average yield is 200 to 300 kg per adult tree. Some can produce up to 1000 kg/year.

Two very different products used abundantly in the food industry are taken from the carob tree: **carob powder and carob bean gum**.

Carob powder is obtained by drying, roasting and grinding the pods after having removed their seeds. The degree of roasting of the carob alters its color and flavor. The higher it is, the darker the carob becomes and loses its flavor.

Carob bean gum comes from the thin brown envelope that covers the grains. It contains a white and translucent endosperm that acts as a thickening agent.

The carob sale price varies according to the month (by 3 Dh/Kg in August-September, up to 7 Dh in April-July) and according to region (3 to 4 Dh in the Rif, 5 to 7 Dh elsewhere). The grains alone are sold at between 22 and 32 Dh.

➤ **Number of plants:**

The number of plants considered for the project is 400;

➤ **Budget Estimation:**

The following table shows the cost of planting one hectare of carob trees.

Designation	Unit	Quantity/ha	Unit Price	Total Cost
Purchase of the plants	Plant	200	15	3000
Working the soil	h	6	100	600
Digging the holes	Days	10	70	700
Fertilization	qx	25	300	7500
Irrigation	m ³	2000	0.5	1000
Labor	Day	5	70	350
Total				12260

To plant 400 trees, which corresponds to 2 ha, the estimated cost of planting is 24,520 DH.

The Almond Tree (*Prunus amygdalus*)

➤ Adaptation Quality

Almond trees are a relatively resilient species of trees that can be grown in quite varied climates. They tolerate not receiving much water and can be used as a rain-fed crop with pluviometry levels of at least 300 mm/year. In these conditions, yields are weak and vary. Irrigation improves production both with regard to quantity and quality, and reduces fluctuations. Droughts at the end of the cycle have less harmful effects and the tree reacts through a more or less precocious loss of its leaves.

Almond trees require cold to blossom in the spring and open out. This species, which originates from the Middle East and Central Asia, requires significant light.

Almond trees are not demanding in terms of soil quality. They tolerate active calcium carbonate without showing any sign of iron chlorosis. This resistance is tied to their faculties of extracting iron from the soil and not to their low iron requirements. They produce the highest yields when in deep, fertile and well-drained soils.

Almond trees play a significant socioeconomic and ecological role. Through their power to adapt to difficult pedological conditions, they can also increase the value of several marginal arid zones.

➤ Cultivation Techniques

The soil must be prepared properly to allow for a young tree to be planted successfully. This also allows for good root development, which makes the trees more resistant to drought, wind and vibrations during harvest.

Labor: The deep work before planting allows the soil to be loosened and aerated in the surface and in depth, to improve water penetration and storing, and for roots to be developed. It is recommended that labor be done through deep-plowing using a moldboard plow, to 70-80 cm in depth and more.

Planting Date

Plantings in November-December are generally more successful than those in January-February. When the trees are planted in November-December, ambient temperatures are low, which prevents the leaf buds from growing. This gives time for new roots to develop before the leaf buds begin to develop.

Depth of Planting

The planting hole must be just big enough to receive the roots so that they are not folded or packed tight.

Compost or fertilizer should never be placed at the bottom of the hole, because it can create problems for the tree.

The safest rule under ordinary conditions is that the young plants are to be placed at the same depth they are developed in the tree nursery.

It is recommended that almond trees be planted according to the structure of 7 x 5 m (approximately 285 plants/ha), in other words, with gaps of 7 m and spaces on the line of 5 m.

Varieties

The number of varieties depends on cultivating conditions (availability of cold and possibility of irrigation). It is indicated to adopt two or three variety associations in a same orchard in order to minimize the risks of loss in case of damage from frost. The principal varieties that have confirmed their performance in Moroccan conditions are in order of blossoming earliness:

Marcona x Fournat de Breznaud;

Ferrgnès x Ferraduel,

Tuono (AF),

Luranne (AF),

Mandaline (AF).

Manure

The quantity of fertilizing elements to be provided depends on the richness of the soil. Soil analyses make it possible to find out the soil's fertility level and suggest corrections in case of deficiency.

When planting, basal fertilization is highly recommended with contributions of 0.5 to 0.8 kg/tree from P₂O₅ and 1 to 1.5 kg/tree from K₂O.

Nitrogen fertilizer should be divided into three contributions – half of the dose to be provided one month before flowering. The rest should be given at the time the fruits are growing.

Pruning of the Almond Tree

There are two types of pruning – pruning to shape and pruning of trees producing.

In order to establish framework branches during the tree’s formation, the ideal number of framework branches recommended is 3, oriented northward or facing the dominant wind. Their insertion in the trunk must be as spaced as possible and there must be an angle of 120° between them. The angle between the trunk and framework branches must be approximately 45°.

However, the exception must be observed for the northern framework branch, whose angle must be above 45°.

We therefore distinguish pruning in the 1st year, 2nd year, 3rd year, 4th year, and the pruning of the trees fully producing. The latter’s goal is to ensure renewal of the fruit branches and regular and well-distributed production in the tree.

Finally, for aging trees that are becoming less productive, it is recommended to remove the large branches in the middle of the tree, in order to provide more light in the center.

Production:

It begins as of the third or fourth year after planting, to reach full production at around the seventh or eighth year. A well-maintained almond grove can produce for 25 to 30 years.

➤ **Number of plants:**

The number of plants considered in the project is 500 plants.

➤ **Budget Estimation:**

The following table shows the cost of planting one hectare of almond trees.

Designation	Unit	Quantity/ha	Unit Price	Total Cost
Purchase of the plants	Plant	285	15	4275
Working the soil	h	6	100	600
Digging the holes	Days	12	70	840
Fertilization	qx	25	300	7500
Irrigation	m ³	2500	0.5	1250
Labor	Day	10	70	700
Total				15,165

To plant 500 trees, which corresponds to 1.8 ha, the estimated cost of planting is 27,297 DH.

The Olive Tree (*Olea europea*)

Olive trees are the most widespread species of fruit trees in Morocco. In certain regions, olive oil is the only fat used in households. Olives are a highly nutritional food. This is also an exchange currency for the souk when the harvest’s surplus is sold.

➤ **Adaptation Quality**

Olive trees can endure the highest temperatures that can be observed in Morocco if its supply of water is sufficient. The sirocco itself does not cause them any harm, but can cause the burning of young fruit if it persists for too long.

Olive trees begin vegetation from the end of winter, when average daily temperatures are between 8 and 9° C. Light winter vegetative rest is beneficial to them. They bloom at temperatures between 20-22° C.

Olive trees vegetate in practically all types of soil, even the least fertile, which qualify them as resilient trees. However, in a highly unfavorable environment, it grows, but bears little or no fruit.

Olive trees are one of the species of fruit trees that endure the saltiness of the soil and irrigation water best (2.7g/l).

Olive trees require abundant water in order to grow and fructify normally, which explains that only the external branches flower and fructify.

➤ **Planting Techniques**

The soil must be prepared with a chisel over a depth of 60 to 70 cm to enable proper root development and good rain and irrigation water retention.

Manure must be applied in the holes intended for the olive trees' planting and mixed with the soil. The young plants must be exempt from illness.

It is recommended to plant the olive trees according to the structure of 7 x 4 m (approximately 357 plants/ha), in other words, with gaps of 7 m and spacing along the line of 4 m.

Olive trees can be planted practically at any time during the year, if they are delivered in sachets. However, it is not recommended to plant them during periods when temperatures are too hot. The recommended planting period is between November and March, and the best time must correspond with the olive tree's vegetative rest.

To enable vegetation to resume properly, the plants must be aged between 18 and 24 months and at least one year old for semi herbaceous plants. The young trees must be supported with stakes to protect them from the dominant winds.

Varieties:

Moroccan olive cultivation is made up by 96% of the "Moroccan picholine" variety, which has a double purpose – oil and canning.

Fertilization:

Since olive trees generally have a root system that is compact and not very deep, providing them with manure will always be beneficial, especially in soils containing little humus and with little capacity to retain water.

For the adult trees, 10 to 20 kg of manure are provided, 1 to 1.5 kg of nitrogen, 0.8 to 1 kg of phosphate, and 1 to 1.5 kg of potassium per tree. For the young trees, 5 to 10 kg of manure, 80 to 100 g of nitrogen, 80 to 80 g of phosphates, and 80 to 120 g of potassium per tree and year of age.

Pruning

Pruning is conducted in order to increase production, limit alternation, curb aging, and remove the dead and excess wood. A distinction is made between formation pruning, annual maintenance and fructification pruning, and regeneration pruning.

Formation pruning is achieved in two phases:

(1) When a tree reaches 1.5 m high, the formation of a mono trunk is monitored by removing low branches and preserving the central stem.

(2) When the tree reaches 1.50 m high, a maximum of 5 framework branches are selected by removing the central stem above the start of a framework branch.

Pruning for maintenance and fructification produces the effect of exposing all the foliage to light, stimulating the appearance of young leaves by eliminating the exhausted wood (the leaf is the place of synthesis of the carbonated elements and has a life expectancy of 3 years). Through this pruning also, the leaf/wood ratio is maintained as high as possible and air must circulate in the entire foliage without meeting zones with foliage that is too dense.

Pruning for Regeneration applies to trees that have been abandoned without pruning or care for a long period. It allows new branches to appear and makes fructification more accessible to harvest.

➤ **Harvest and Conservation**

Harvesting requires bags and light ladders to improve productivity and for quality harvest. Using plastic nets extended beneath the trees prevents the olives from getting dirty. Harvest rakes improve gatherers' yields and reduce damage to the fruits intended for canning. According to the fruits' degrees of maturity, they are classified as: green olives, "olive tournante," black olives and wrinkled black olives.

The yield of a gatherer from trees bearing an average of 40 kg of fruit is 120 kg/day with 3 trees/day).

➤ **Number of plants:**

The number of trees considered in the project is 2600 plants. The rural commune of Boudinar will plant the trees.

➤ **Budget:**

The following table shows the cost of planting one hectare of olive trees.

Designation	Unit	Quantity/ha	Unit Price	Total Cost DH
Purchase of the plants	Plant	350	15	5250
Working the soil	h	6	100	600
Digging the holes	Days	18	70	1260
Fertilization	qx	25	300	7500
Irrigation	m ³	3500	0.5	1750
Labor	Day	10	70	700
Total				17060

To plant 2600 trees, which corresponds to 7.5 ha, the estimated cost of planting is 127,950 DH.

ROYAUME DU MAROC
MINISTÈRE DE L'INTÉRIEUR
PROVINCE DE DRIOUCH
COMMUNE RURALE DE BOUDINAR

Attestation de co-financement

Projet CBA de l'association Fouss-G-Fouss

Nom + Prénom : El Houssein Saïdi

Fonction : Président de la commune rurale de Boudinar

Institution : Commune Rurale de Boudinar

Adresse : Boudinar – 62152 – Caidat de Tamsamane – Cercle du Rif – Province de Driouch .

Par la présente, nous certifions que la Commune Rurale de Boudinar appuiera l'association Fouss-G-Fouss (CR Boudinar), dans la réalisation de son projet d'Adaptation Communautaire (dans le cadre du programme PNUD CBA)

Notre contribution à ce projet est la suivante :

- Fourniture et plantation de 10.000 plants d'oliviers (dont en nature équivalent à 100.000 dh), sur 100 ha .
- Organisation de 6 réunions de Comité de Pilotage conjoint pour les projets TAFADNA & FOUSS G FOUSS : mise à disposition de la salle de réunion de la Commune, invitation des partenaires, pause café
- Appui à l'organisation d'un Atelier Régional Final : invitation des partenaires (au niveau régional), mise à disposition salle de réunion, ordinateur, projecteur

La Commune Rurale s'engage également à apporter tout appui à l'association Fouss-G-Fouss (organisation, suivi et reporting, procédures administratives), à travers l'équipe technique communale.

Fait à boudinar , le 02 mai 2011

Président

El Houssein SAIDI





وزارة الفلاحة والصيد البحري
Ministère de l'Agriculture et de la Pêche Maritime

N° 786 D.P.A. / 24/5/19/2

Nador, le 07/07/2019

تأشير في

رقم 24/5/19

LE DIRECTEUR PROVINCIAL DE L'AGRICULTURE DE NADOR

A

MONSIEUR LE PRESIDENT DU CONSEIL COMMUNAL DE LA
COMMUNE DE BOUDINAR - ROVINCE DE DRIOUCH

Objet : Projets programmés dans la C.R. Boudinar.

Réf. : Votre envoi n°195 du 05/07/2019.

Suite à votre envoi sus-référencé, par lequel vous m'avez demandé de vous faire transmettre les informations sur les projets de ramatisation proposés au niveau de votre Commune, j'ai l'honneur de vous faire connaître que la Direction Provinciale de l'Agriculture de Nador a programmé dans le cadre des travaux d'aménagement hydro-agricole concernant la réparation des dégâts de crues enregistrés au niveau des périmètres de Petite et Moyenne Hydraulique dans les provinces de Nador et Driouch, la raménagement et la reconstruction des tronçons de ségias endommagés sur une longueur de 1500 ml dans le périmètre Boumaad.



DIRECTION PROVINCIALE DE L'AGRICULTURE DE NADOR

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