User relationship with the Tazekka National Park protected natural area (Morocco)

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Abstract
We conducted a study on the impact of the exploitation of forest resources by the local population in the protected area, as this factor has a negative impact on the park. This is due in particular to the fact that the topography of the park is rugged and hard, which has made the cultivated areas narrower. The population of the park remains rural in its entirety, it practices agriculture on small surfaces because of the topography of the region, and also practices strong pastoral activities in the forest area. The forest is also a major source of energy for much of the park, providing wood for cooking and heating. All these actions damage important areas of the forest, exceeding the growth rate during the year. Although the right to graze in a fully protected area is restricted, pastoral resources are depleted by the inhabitants. As a result, the primary goal of restoring balanced ecological sites has not been achieved by limiting the right to grazing and creating a fully protected area.

Keywords: Environment, Tazekka National park, Fully Protected Area, local population Pastoral Resources, Depletion of Resources, evaluation, awareness raising

1. Introduction

According to (state secretariat for water and the environment, 2002). The Moroccan flora contains about 7000 inventoried species, of which 1350 are endemic. The fauna is also very diverse with more than 24000 species. However, this biodiversity is threatened by over-exploitation of resources, deforestation, urbanization and the loss of wetlands, as well as pollution.

Aware of the need for conservation and protection of these environments, since the 1930s, Morocco has embarked on a strategy of protected area networks, particularly parks and nature reserves, through the adoption of a set of laws governing national parks parks (state secretariat for water and the environment, 2016). A total of 10 parks and 146 reserves with significant ecosystems have been created. For example: Tazekka National Park (TZNP) plays a vital role in recreation and is a privileged environment for ecotourism and environmental education.

The present study concerns the TZNP, which was created with the main objective of protecting all the existing natural resources at the top of Jbel Tazekka, and especially the cedar forest (Cedrus Atlantica), which is isolated on this peak, far from other Moroccan cedars, such as those of the Middle Atlas, or those of the Rif.

Since 2002, the TZNP has experienced a certain dynamism that has resulted in many studies and actions in the context of environmental education. The High commissioner for waters and forests and the fight against desertification (HCWFAD) is committed through several partnerships (Coopération Internationale Allemande(GTZ), Enda-Magreb, Ministry of National Education, Higher Education, ...) in a strategy of environmental education within the parks. This commitment initiated the creation of an environmental education unit in the company of an environmental education program.

In order to manage better the natural resources within the park, guarantee and ensure the local population a support for their socio-economic activities and therefore sustainable development, the TZNP is subdivided into three ecological zones (High Commissioner for Waters and Forests and the fight against desertification, 1996):

- Zone I: protected natural areas (PNA) of 1,115 ha including the 680 ha of the current park.
- Zone II: managed natural sanctuaries (SNG) of 2,497 ha.
- Zone III: natural resources management zone (ZGRN) of 10,125 ha.

This study is mainly concerned with the nature reserve zone aiming at the protection of nature and the maintenance of natural processes in a dynamic, undisturbed and unaltered state.

In this area, which covers an area of 1,115 ha, no human intervention is permitted except for duly authorized scientific research. The objective of this study is to evaluate in this zone, the state of conservation of forest resources according to the ecological and socio-economic context. The questions raised by the evaluation of environmental education in TZNP can be numerous, including what is the level of sensitivity of the local population based on their practices and activities, as well as the level of their natural resource exploitation behaviors: water, rangeland and forests.

2. Material and method

In order to complete bibliographic approaches through field investigations, questionnaires have been drawn up. The content of these questionnaires has been carefully considered, designed and developed in close collaboration with the Coordinator of the Environmental Education Program at HCWFAD, as well as with the Environmental Club Coordinator of the Provincial Delegation of National Education in Taza, corrected and modified by my teachers. The survey was conducted among the local population. The questions proposed were of two types: open (they ask for a free answer) or closed (they ask for a single or multiple fixed answer). The survey was also based on the individual investigation method to avoid any interaction and redundancy of ideas among school children. These are specific surveys with several participants, in an informal setting, moderated by a facilitator. The purpose of the surveys is to generate qualitative data on the topics of interest by creating an exchange of questions in this paper.

Furthermore, to better meet the objectives of this study, field investigations were approached using the semi-structured survey method at Douars impacted in protected natural areas (PNA). The results led to an socio-economic analysis of the area context and identify the existing activities that may threaten the conservation of the areas concerned. In order to identify the socio-economic factors that affect the environment, attention has been focused on highlighting the way in which natural resources are used through the collection of the following information:

- Socio-economic characteristics of the population.
- Mode of exploitation of forest resources.
- Place of the forest in the life of the population.

The survey of local actors, was carried out during the summer of 2019. It allowed to fill 50 questionnaires with the user population of the (ZNP) distributed on the 5 Douars of the 2 communes among the 6 that cover the park.

The Douars involved in this study are recorded in table 1.

Tableau1. Douars of the protected natural area users.

Protected natural area	User Douars	rural commune
Tazekka cedar area	Idissane Beni Snane	Bab Bouidir
	Quitoune	Bouchfâa
zénaie area of Bab Qafza	Dher El Aryane, Ghanaj	Bouchfâa

The area of the study zone is subject to the forest regime and forest legislation and ranks in the private domain of the state. Our study concerns the (PNA), which is subdivided into two zones namely the top cedar zone of Tazekka (817ha) and the zone of zenaie of Bab Qafza, (61ha). They are part of the forest of Bab Azhar. The summit cedar zone represents a forest ecosystem that contains 3 strata: pure cedar stratum, cedar stratum mixed with green oak, and cedar stratum mixed with zen oak. The zone of zénaie of Bab Qafza contains a beautiful high forest of pure zen oak (Maatalaoui, 2018).

3. Results and discussions

3.1. State of the forest resources and their importance in the life of the local population

3.1.1. Reviews of local people :

Several communication sessions were held for the benefit of the park's population in 1998, which included 10,000 beneficiaries distributed in 29 Douars (High Commissioner for Waters and Forests and the fight against desertification, 1998). The survey showed that 56% of the respondents do not know that they are in a national park, compared to 44% who know it, of which only 10% know the objective of the TZNP. Their only source of information is the agents of HCWFAD .This lack of knowledge is mainly due to the lack of extension of the park's reason to be.

3.1.2. The importance of the forest in the economy of the local population:

➢ **Livestock:**

Livestock is the most important activity in the study area. To make livestock data consistent, we need to transform the whole herd into a Small Animal Unit (SAU), according to the following standards, Qarro (2000),:

1 sheep unit = 1 SAU
1 goat unit = 0,8 SAU
1 bovine unit = 5 SAU

The study showed that the cattle are mainly sheep with a total of 923 heads, followed by goats with 452 heads, and some cattle with 98 heads, which makes a total of 1800 SAU in our samples.

The average herd size per family is about 36 SAU per household. 46% of SAU products are for sale. The number varies considerably from one year to another depending on the climatic conditions, because the numbers increase if the weather conditions are adequate. On the other hand, the breeder decreases the number of his herd according to the quality and the quantity forage available. The mode of feeding of livestock in the study area is based mostly on the natural fodder resources and secondarily on the stubble and the complementation. The graph below presents the annual food calendar according to the animal species:

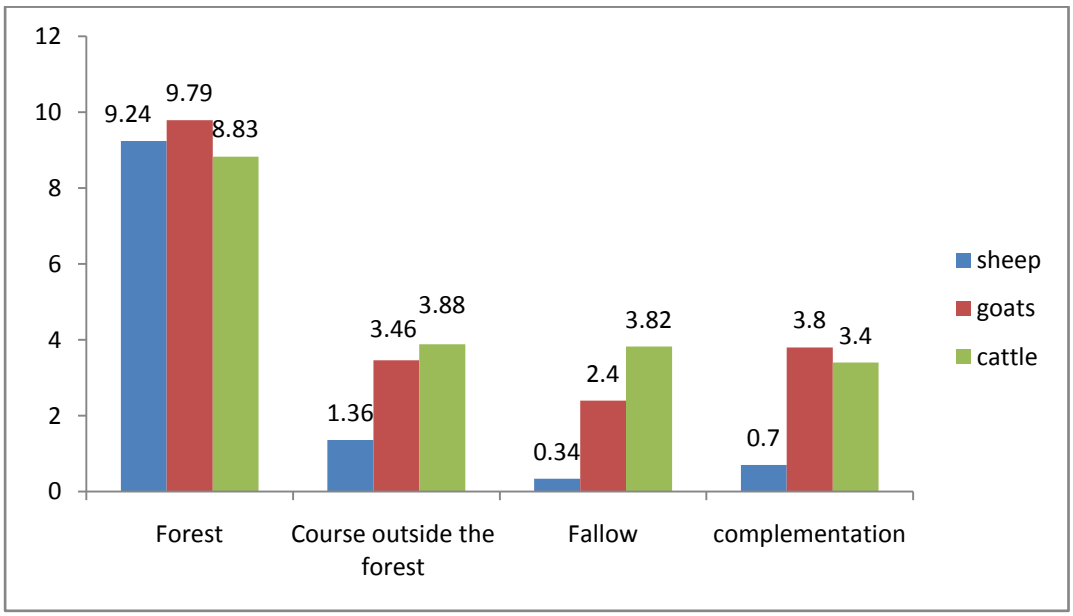

Figure 1: dietary calendar according to animal species.

From the figure above, it appears that:

- The forest rangelands ensure the needs of the livestock for 9 to 10 months in the year.
- Non-forest rangelands are used from June to September by cattle and sheep.
- Fallow land is an important source of food for cattle and sheep during the autumn.
- The supplementation is used for the three sheep, goat and cattle species between November and March.

In times of food shortage caused by insufficient rains, liming remains the main practice that ensures the feeding of sheep and goats.

The distance travelled by cattle varies between 500 m and 7 km per day, depending on the situation of the Douars. Herds leave the homes mainly in the morning and come back constantly in the evening. They also spend on courses between 6 hours and 9 hours with an average of 7 hours.

Photos 1 and 2 taken in the Douar el Quitoun.

Studies have shown that there is almost identical anthropogenic activity in ZNP (cedar and zenai) with a decrease in momentary pressure on the ZNP during periods of peak crop production outside the study area.

Thus, the statistical analysis of the species richness and overall recovery within the ZRA zone (cedar and zenai) and in the surrounding area shows that there is no effect of the status of the reserve on biodiversity, and that the right of way restriction of the entire park area is only hypothetical.

The rate of overgrazing is 28% (quarro, 2000) taking into account the contribution of agricultural enclaves and complementation In order to reduce the effects of overgrazing, protection measures have been proposed by the sustainable rangeland use scheme, with an average area of 2 320 ha per year for reforestation and regeneration, with a rotation of 5 years

over a period of 25 years (GIZ 2010). The compensation measure was implemented in the TZNP in 2006.

Today, the area protected in the TZNP covers 1,600 ha, of which 900 ha are subject to compensation. The compensation is used for different actions, such as the purchase of livestock feeds, construction of tracks, bringing homes closer to water sources and others.

- **Wood consumption in comparison with other types of energy:**

The study area is characterized by a cold climate marked by low temperatures, spread over a period of 5 months, between November and March.

Table 2. Types of energies and their uses

Energy	Quantity/person /week	Unit price in MAD	Usage
Fuelwood (kg)	188	3 DH	heating and cooking
Olive core (kg)	30		Cooking
Animal dung (kg)	40		Heating
Charcoal (kg)	3	7 DH	heating and cooking
Gas cylinder (small)	2	11 DH	heating and cooking
Electricity (kw)	7	1,20 DH	Lighting and cooking

Firewood consumption peaks during the cold period, and due to unavailability, the riparian population begins to move towards the use of energy sources important for heating. The estimate of the average consumption per week for a 6-person household is up to 188 kg of fuelwood, and thus the estimate of annual consumption can go up to 9 t per household per year (High Commissioner for Waters and Forests and the fight against desertification, 1996).

For this reason, firewood is one of the main energy sources taken from forests and is used for domestic purposes, namely: cooking, heating, bathing and baking.

Photo 3 Douar Admam

The collection of fuelwood is done throughout the year, with an increase in winter. Several factors influence the level of consumption of fuelwood, including the size of the household, the availability of family labor for the family supply and proximity to the forest.

According to household surveys, all families use firewood, which is often collected by a male limb. Transportation is carried out on the back of a man or on the back of a mullet. This collection concerns the green oak wood and cedar branches. In order to cater for their needs, household members go in search of firewood in the forest, once or twice a week.

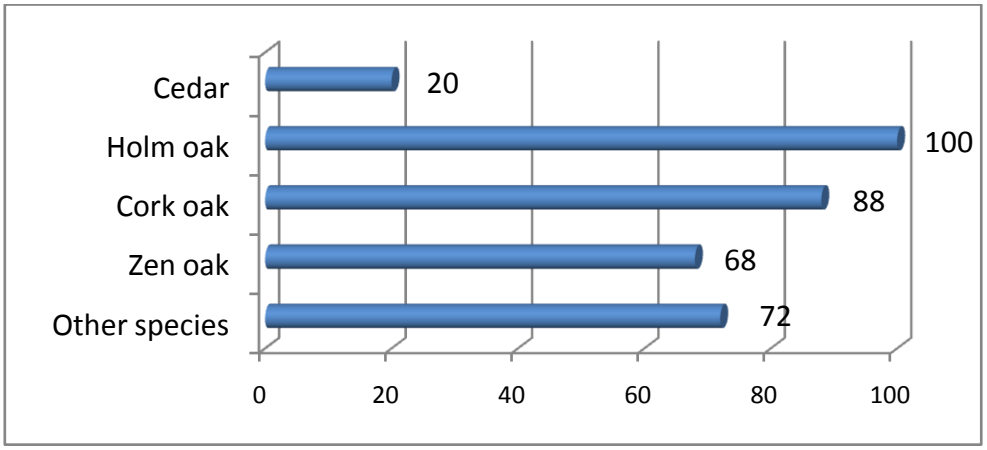

Figure 2. type of wood and sampling rate.

We also note that there is a trend in the population towards the use of gas cylinders, to satisfy their daily need for lighting and cooking. The consumption varies between 1 and 4 small bottles per week. This, by converting a large bottle in 4 small bottles, with an average of 2 small bottles per household per week, with a weekly cost of 22dh per household.

Our study also reveals that access to electrification is close to 66% of households, however the use of electricity is mainly used for lighting and not for heating, given its very high price. Weekly consumption of 7 kw per household, with a cost of 1.20 DH / kw. Dried dung is less used in the study area and according to the previous table, 6% of households use it for heating, which has an energy value comparable to that of wood and can become an important energy resource. It can be used for both heating and cooking needs, to cope with the scarcity of wood and the high cost of other energy sources, since a healthy animal can produce an annual dung weight equivalent to four or five times that of his body (Gérard and all., 2003).

3.1.3. Resource states and cause of degradation:

- **State of forest resources:**

According to the figure 3 below ,the population confirms that the forest resources in the study area seem to be decreasing. 13% of the respondents believe in a serious degradation, against 13% who suggest that the forest is degraded, while 30% say it is little degraded for 44% of respondents consider that the forest resources are rather in satisfactory condition.

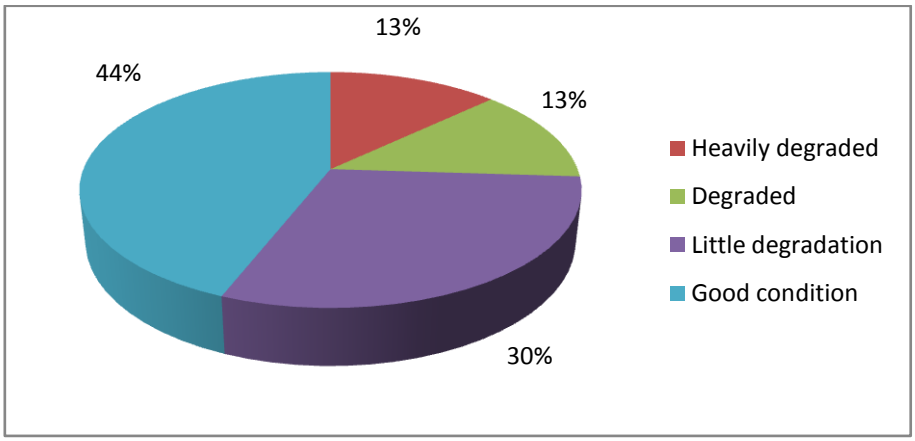

Figure3 state of forest resources

- **causes of degradation:**

Given the poverty and lack of income-generating activities, the local population remains dependent on the forest to provide for their daily needs. The main causes of forest degradation according to 84% of the responses are due to overgrazing. About 48% of the replies confirm that the degradation of forest resources is mainly due to adverse ecological and climatic conditions.

The places considered to be the most degraded are the closest to the population, or areas far from the control of the authorized foresters are over-exploited forest resources, with the absence of income-generating activities.

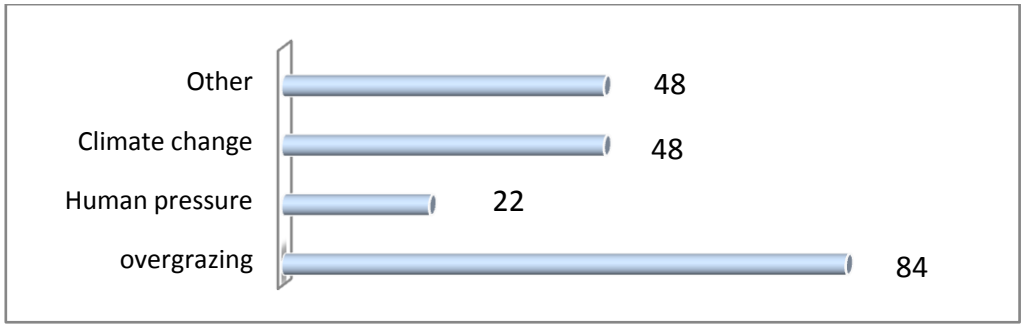

Figure 4 cause of degradation

In return, respondents believe that the most conserved places are mountain peaks, hilly terrain, or close to the control of forest wardens, and local authorities (Sheikh). All the respondents express the absence of a traditional or modern organization or management (association), comparable to that of the forest area managed by the compensation associations in partnership with "eaux & forets".

- **the factors acting for conservation**

The surveys allowed us to have a return of the population in relation to the respect of the laws governing the exploitation of the forest. About 66% of the population recognizes the non-respect of these laws, whereas only 34% affirms their respect.

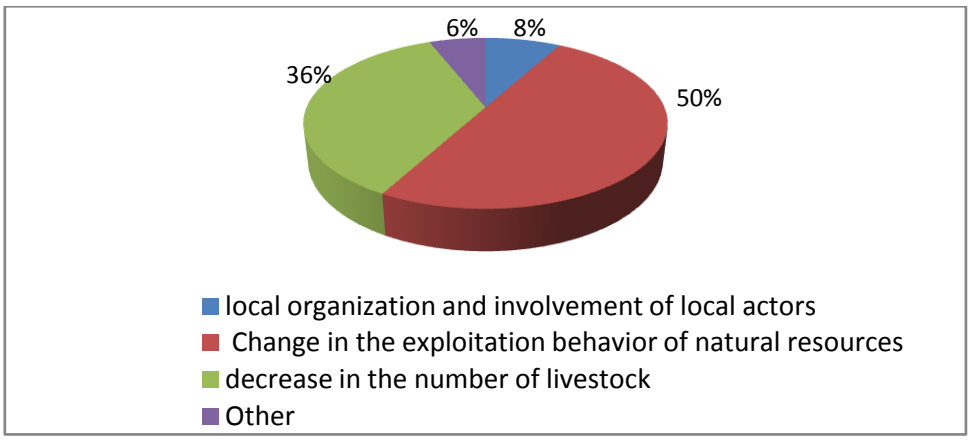

Figure5 factors acting in favor of conservation

The family and the school are considered as pillars of environmental education in addition to civil society. On the other hand, several factors influence the personality of the individual,

including school, community and profession. In this context we have observed the influence of pupils and students in the modification of parental behavior, either through the sensitization by legal texts that manage the field of the TZNP, or by the detection of the dangers to which the environment is confronted by because of parents' practices. The 50% of the households are for the necessity of the change of the behavior of exploitation of the natural resources. 8% also agree on the need to create local organizations, with the involvement of local stakeholders for the conservation and sustainable management of forests in the area. 36% expressed that conservation of resources cannot be achieved unless the number of livestock is reduced together with the creation of jobs and income-generating activities.

The realization of the projects by the various administrations and the local authorities (education, health, equipment, drinking water, electricity), allow the fair distribution of the incomes, and an improvement of the living conditions of the populations bordering the forest massif. Most of the respondents pointed out that the measures taken by local officials and actors are insufficient and do not take into account the opinions of the local population.

4. Conclusion

The (PNA) consists oftwo zones; namely the zone of the summit cedary of Tazekka and the zone of zenine of Bab Qafza. They are of an area of 1115 ha. These two zones are characterized by exceptional forest formations.The objective of our study is to assess in these two areas the state of degradation and conservation offorest resources according to the ecological and socio-economic context.

Although the status of PNA gives these zones full and permanent protection against the route, it remains that they are under a great deal of pressure. Influenced by livestock farming, as the main activity in both areas, they are subject to overexploitation of pastoral resources especially during the winter period of food shortage. It even affects the on feet capital by limbing and toppingwhich often lead to a loss of biodiversity, threatening thusthe sustainability of the ecosystems in question.

According to (High Commissioner for Waters and Forests and the fight against desertification, 1996) the restoration and the conservation of vegetation diversity can only be achieved by:

- Carry out silvopastoral improvements to increase the pastoral value of the (PNA).
- Cut thinning at high density units to give the undergrowth a chance to grow better.
- Compensate the grazing rights of the user population to encourage them to respect the

defenses and bring together the (PNA) breeders within the associations of pastoral forest management for a real involvement in the process of conservation and development of natural ecosystems.

• Distribute improved ovens for the population to reduce wood pressure on the (PNA).

• Carry out outreach and public awareness work on the(PNA) within the FNTZ and the need for their collaboration at various levels in order to ensure rational and sustainable management.

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