



IMPETUS Morocco

What is a good pasture?

Comparing local and scientific knowledge on forage plants in Southern Morocco

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INTRODUCTION

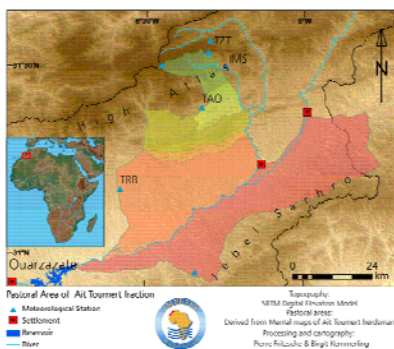
Investigating local environmental knowledge is crucial to understand functional aspects of a sustainable land use in social-ecological systems, particularly under conditions of high environmental variability^{3,4}. Our study aims to compare and synthesize anthropological and ecological data on the role of local knowledge for a pastoral-nomadic range management². As an example of local environmental knowledge, we take the perception of forage plant values and ask:

How do herdsmen judge pastoral conditions?

Is local knowledge on forage plants a key element for mobility decisions?

The management strategies of a Berber fraction (Ait Toumert) in the High Atlas region of Morocco are adapted to the steep altitudinal gradient within the pasture area. Along this gradient, average rainfall varies from 500 to 150 mm/a. This results in a high spatial and temporal unpredictability of natural resources.

From June to September, nomads use summer pastures (dark green) in the High Atlas Mountains. In winter, they move to submontane pasture areas (yellow to red) in the Basin of Ouarzazate. Transition pastures (light green) are used in spring and autumn.



CONCLUSION

Our results can be seen in the context of coping with environmental variability. Species which can accumulate forage, i.e. perennial species, are able to buffer the effects of rainfall variability on available forage. This buffering ability is especially important for periods with forage scarcity, either within the year or in times of drought. Berber herdsmen implicitly integrate their long-time experience into the valuation of key resource species. In periods with forage scarcity their mobility decisions build on the presence of reliable plants.

METHODS

Data assessment

Anthropological methods:

- Free Listings (17 herdsmen were asked a list of plants consumed by goats and sheep)
- Participant observation and semi-structured interviews

Ecological methods:

- Cover values [%] of plant species on pastures, estimated on 100 m² plots (n = 16) along an altitudinal gradient (1300 m to 3000 m)
- Assignment of species to growth forms

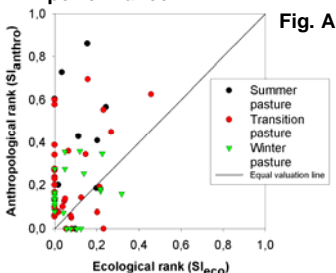
Data analysis

Ecological and anthropological data on forage plants were processed using the Software ANTHROPAC¹. Data were analyzed by calculating Smith's Indices (SI), a weighted rank index. SI values are determined by

- | | |
|---------------------------------------|--|
| SI_{eco} : | SI_{anthro} : |
| - species abundance | - position in a Free Listing |
| - number of plant species on the plot | - number of plants named by the informant |
| - occurrence on other plots | - occurrence in other Free Listings ² |

RESULTS

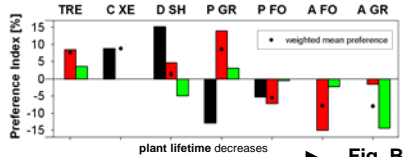
A Does local valuation correspond to ecological performance?



We found no significant correlation ($R = 0,24$; $p > 0,05$). **Local valuation clearly depends on where and on which pasture forage plants are found.** Plants on high summer pastures (black) are much higher ranked by Berber herdsmen (ANOVA: $F = 100,5$; $p < 0,05$) than those on transition and winter pastures (Fig. A).

B Do certain plant traits explain herder's preferences?

We added SI_{anthro} and SI_{eco} for every pasture type. We then calculated how many percent can be assigned to a certain growth form. Fig. B illustrates a preference index calculated as the difference between local and ecological values.



TRE Trees; C XE Spiny, cushion like xerophytes; D SH Dwarf shrubs; P GR Perennial bunch grasses; P FO Perennial forbs; A FO Annual forbs; A GR Annual grasses

Herdsmen prefer woody species and perennial grasses. These are much more valued than their occurrence on local pastures would imply. For some growth forms such as small shrubs, local valuation differs more than 15 % from ecological value (Fig. B). Accordingly annual plant species and perennial forbs are less valued. Even in the dry season they occur more often on pastures than on herdsmen's listings.

Life time matters:

The more long-living a plant species is, the more it is preferred by local users.

DISCUSSION

Because availability of forage is one of the most important factors for mobility decisions, we assume that Ait Toumert herdsmen prefer areas and plants which provide the most reliable source of biomass.

A Nomads value plants on summer pastures

The different pasture types follow an altitudinal gradient. This gradient is characterised by an increase of total plant biomass and a decrease of its variability. Summer pastures are more reliable than winter pastures, because herdsmen can move to the same patch of this pasture every year.

B Nomads prefer woody and perennial species

These species represent a more reliable source of forage than annual herbs and grasses, even in times of drought. Summer pastures are dominated by these growth forms.

Local valuation may also reflect the traditional access rights. Only the summer pastures are exclusively used by the fraction Ait Toumert. In addition, results might be biased, because herdsmen were interviewed while staying on their summer pastures.

Although herdsmen were asked to name forage plants, local valuation cannot clearly be separated from their valuation as firewood and timber. However, the valuation of more long-lived species is a general trend (Fig. B).

For Berber nomads a good pasture is a reliable pasture.



References

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