ETHNOBIOLOGY LETTERS

Research Communications

Exploring Environments through Water: An Ethno-Hydrography of the Tibesti Mountains (Central Sahara)

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Abstract An ethno-hydrography, studying the organization of space through water, can provide a key to understanding how people conceive their environments in a holistic way. Based on mapping as a dynamic process, different representations of river systems among the Tubu Teda, who live in the Tibesti mountains (Central Sahara), are described in this paper. I first discuss a large-scale subdivision of the mountains into drainage basins, and then representations of a sub-regional and local river system, including an engraving on a sandstone rock. Finally, I discuss these case studies in the context of holistic experiences of environments and the dynamic processes of mapping.

Received June 7, 2020
Accepted December 7, 2020
Published January 8, 2021

OPEN ACCESS
DOI 10.14237/ebl.12.1.2021.1709

Keywords Teda, Central Sahara, Tibesti, Water, Natural resources, Mapping

Introduction

When ethnographically exploring river systems in the Tibesti mountains (Northern Chad) and among Teda, its inhabitants, one could put the accent on water as a resource. In fact, water, as a prerequisite for the existence of life, is especially relevant in hyper-arid deserts, such as the Central Sahara (Figure 1). However, rivers in the Tibesti do not have water every year; even in years when precipitation is sufficient, they have water only during a relatively short period of time. Thus, if people attach importance to river courses, it is not only because they sometimes have water; rather rivers seem to contribute to their understanding of the environment. This idea is also expressed in a study of spatial orientation among reindeer herders (Istomin and Dwyer 2009). Here, rivers are an essential feature in describing and understanding space.

There seems to be a growing interest in the relationship between humans and bodies of water in social science in general (e.g., Gagné and Borg 2016; Hastrup and Hastrup 2016) and in ethnobiology in particular (e.g., Silvano et al. 2007). While the perception and valorization of water and the access to it as a resource represents a major concern of the emerging discipline of ethno-hydrology (cf. Ruth et al. 2019; Vargas-Velázquez 2019; West et al. 2016), knowledge about how water organizes space and how it allows orientation (cf. Gladwin 1970; Hutchins 1995:67; Istomin and Dwyer 2009) comes into focus in what we could label "ethno-hydrography." Such a *graphy* of water (and, through water, of space in general) allows the understanding of environments, including their resources and the ways to travel through them. Discussing cases of the Teda's hydrography of the Tibesti, I show how the aim of ethno-hydrography is not principally the cartography of watercourses, but the holistic and dynamic mapping of environments, which include different kinds of topographic features, non-human beings, natural resources, and ways to travel through.

As a methodological tool, I use a kind of ethnographic participatory mapping. In fact, the holistic understanding of always-changing environments requires rather the dynamic tool of mapping than a fixed cartography. According to followers of the human turn in geography, maps have to be understood as "practices," and they "proceed from action" (Kitchin et al. 2009:1). Such action-oriented perspectives in mapping try to situate

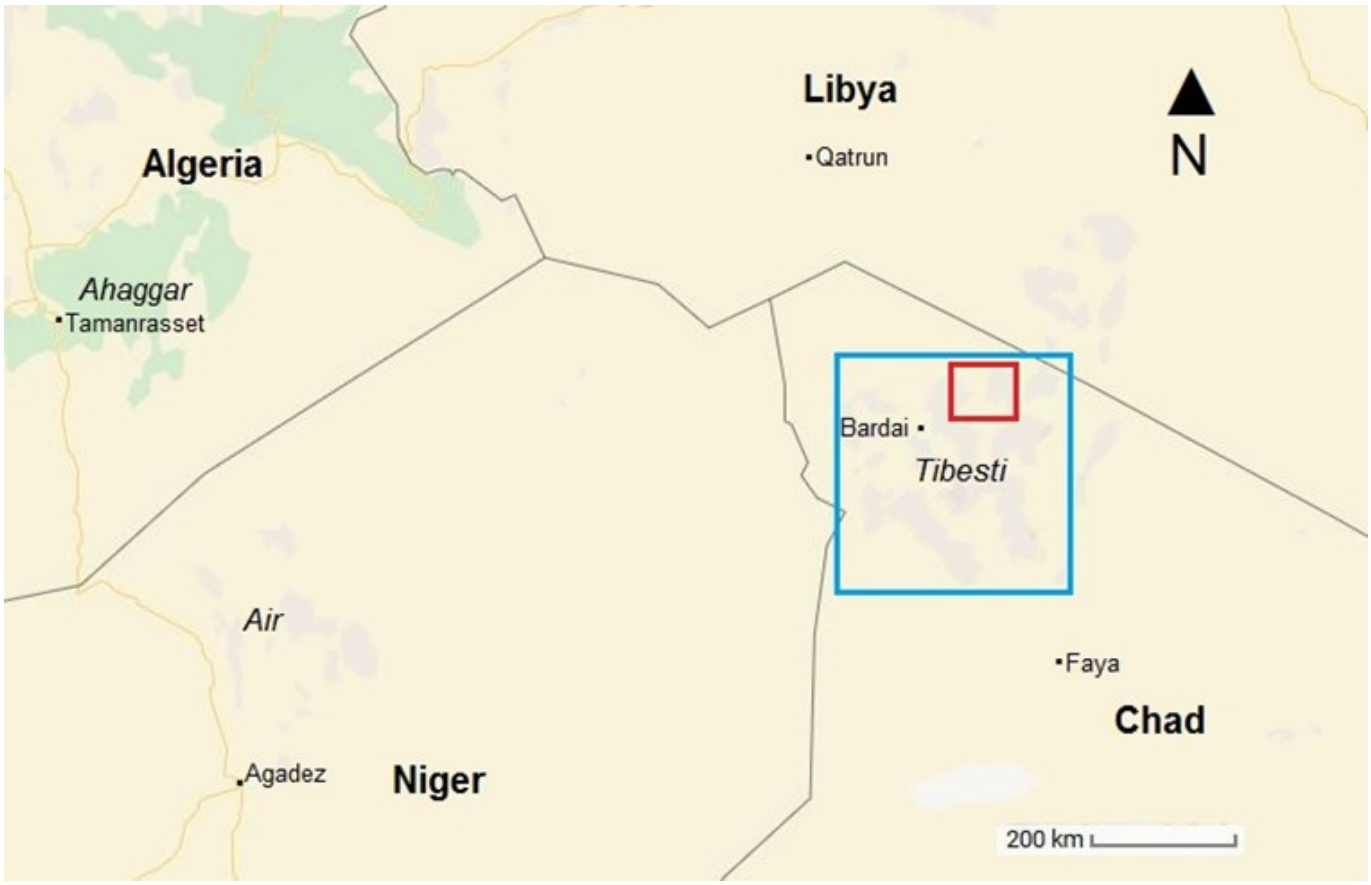

Figure 1 Regional map of the Central Sahara, approximately delimited by the Tibesti, Air, and Ahaggar. The blue rectangle corresponds to Figure 2, and the red one to Figure 3. Source: Google Maps, modified by the author.

representations "in the flow of a broader process of knowledging including crucial pragmatic dimensions" (Söderström 2005:14). The "transitory," "fleeting," "relational," and "context-dependent" character of maps means that "they are always mappings" (Kitchin and Dodge 2007:331).

I start with a rough picture of the drainage systems and watersheds of the entire mountain range (Figure 2), then move on to the particular case of the river system around Aozu (also: *Oozu*; French: *Aouzou*) in the north (Figure 3), and finally conclude with a "prehistoric" map on a sandstone block (Figure 4). On the basis of these cases from the Tibesti, I provide keys to how people understand their environments in a holistic way through the mapping of river systems, what we could call an "ethno-hydrography."

Regional Background

The Tibesti is a mountain range shaped by volcanism, the main phase of which was in the Neogene. The area reaches roughly from the 24° latitude in the north to 19° latitude in the south. Some of its mountains—called *emi* in the language of the Teda—exceed 3,000 meters, and the Emi Kussi, at 3,415 meters, is the highest mountain in the Central Sahara.

The hydrographic boundary between the Lake Chad basin in the south and the Mediterranean basin in the north runs across Ēy Domma, a relatively small mountain in the central part of the Tibesti (Figure 2). Annual precipitation in the entire mountain range, which increases with altitude, is extremely low, resulting in arid to highly arid environmental conditions (Grunert 1975:9). At the same time, strong differences in precipitation quantities were observed on the northern, western, and southern flanks of the mountains, which are due to the varying influence of tropical-monsoonal and ectropical-cyclonic air masses (Grunert 1975:9). This results in relatively abundant precipitation in the southwest of the massif, with a maximum in August, while in the north, precipitation, which is at its maximum in May, is much lower. Annual precipitation can vary significantly. For

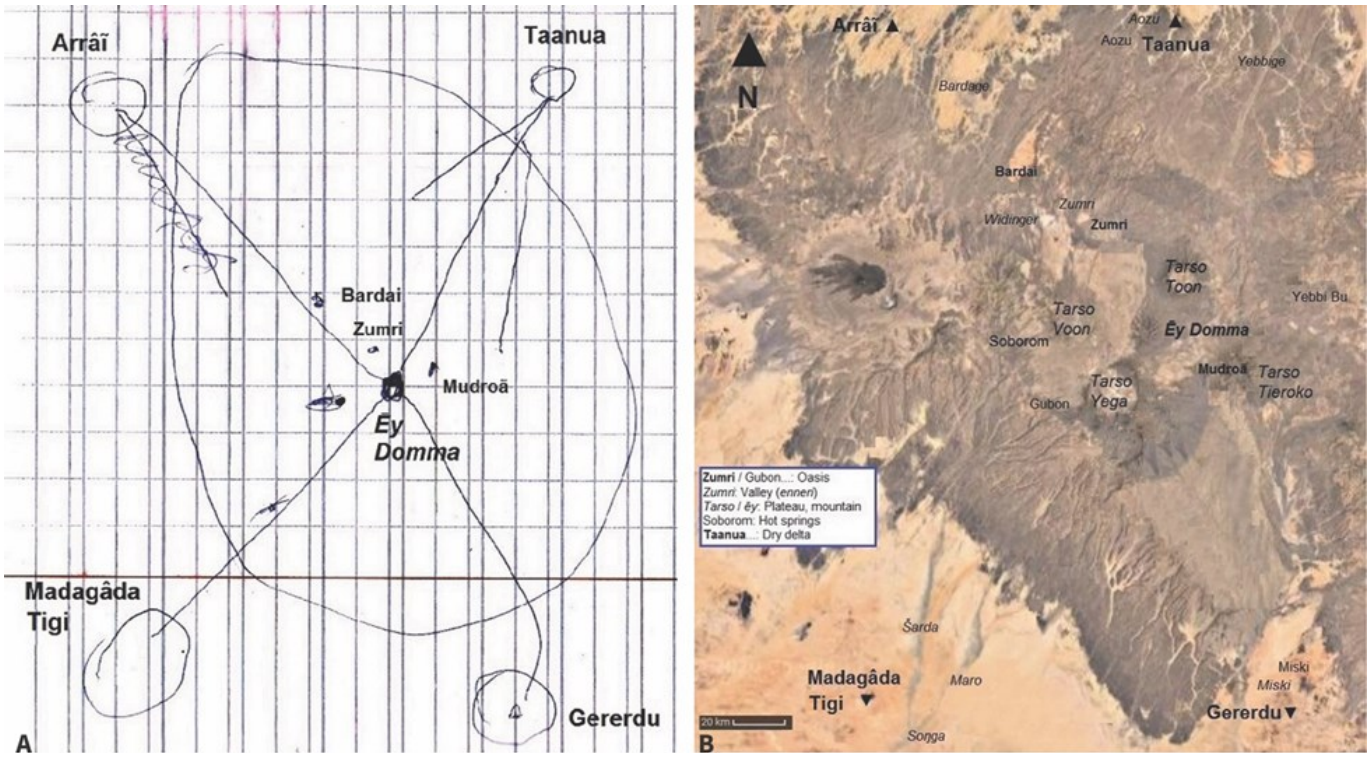

Figure 2 A Drainage systems of the Tibesti. Sketch by Mahadi Shahã from the author's notebook (Faya, March 31, 2020). Sketch completed with toponyms by the author. **B** Satellite imagery of the Tibesti mountains. The view corresponds to Mahadi's sketch. Source: Google Maps, modified by the author.

example, Bardai had 60.7 mm in 1966 and 0 mm in 1970 (Heckendorf 1972). Plateaus, called *tarso*, are around or above 2,000 meters and thus receive sufficient precipitation for steppe-like vegetation to develop (Gabriel 1973:11–14).

The annual average temperature for Bardai has been calculated at 23.5°C, although it can reach a maximum of 40°C in the summer months. Night frosts can occur at high altitudes, especially in January (Grunert 1975). The low humidity and high noon temperatures lead to potentially high evaporation rates (Heckendorf 1972), which, especially in the case of rivers draining to the north such as the Yebbige and the Bardage, lead to some water loss in their middle reaches, and much greater loss in their lower reaches. This usually causes rivers to dry up before they leave the mountains (Grunert 1975:12).

As the Sahara dried out over millennia, it is assumed that living creatures found sanctuary in the Tibesti and other mountainous massifs (Air, Ahaggar). It is likely that Neolithic cultural elements spread from here to other Saharan and North African sites (cf. Caneva 1993; Garcea 1993). The Tibesti may have been inhabited for thousands of years by a population from which, with the arrival of migrating groups, the present Teda were formed. The Teda, a group of the Tubu people, are organized today in 33 clans (*arbi*) with one supreme chief, the *derde*. They are speakers of a Western Saharan language (Tedaga) and live in northwestern Chad, southern Libya, and northeastern Niger. In the past, there have been repeated migrations of groups to the Tibesti (Fuchs 1961:91). But groups also left the Tibesti, because of the scarcity of resources here, to take advantage of neighboring pasture grounds, such as those to the west of the mountain range (e.g., Tchigai plateau), as also those to its east (Ennedi).

Methods

This study of the river systems of the Tibesti is part of an ethnographic research project on space and time in the Central Sahara and among the Teda, which I have been conducting in the northeast of Niger and northwest of Chad (here mostly in the Tibesti mountains) since 2014 (e.g., Musch 2015, 2017, 2019). Repeated visits to communities and peoples allow me to discuss my findings with them, to discover collectively new aspects to be explored and, if

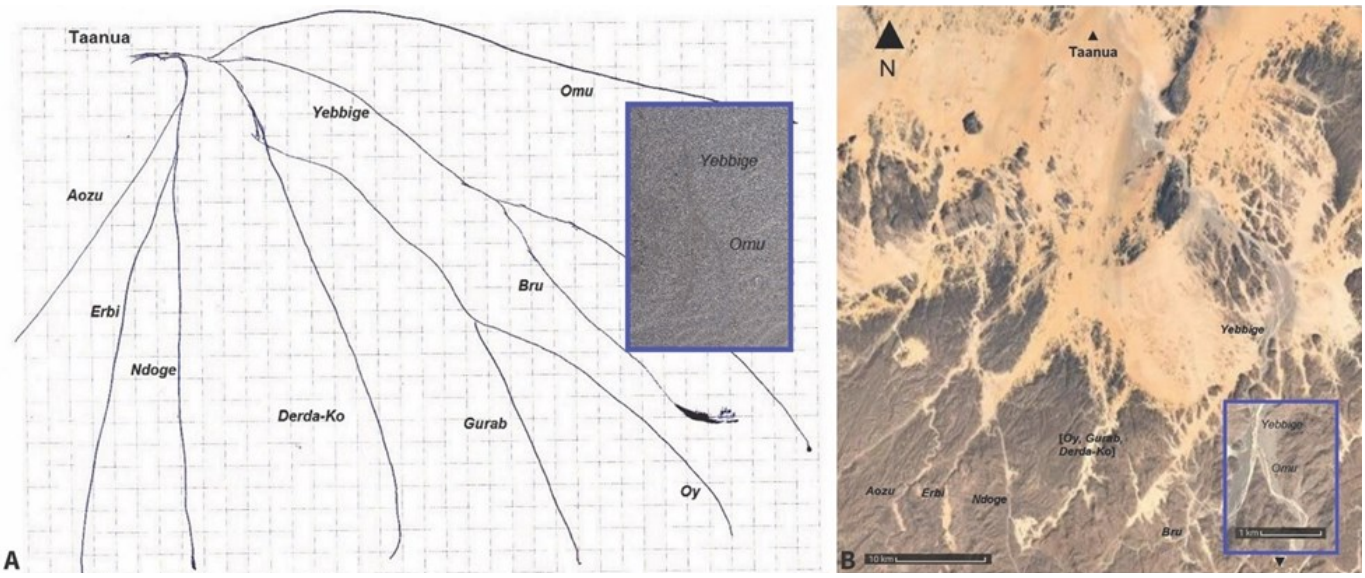

Figure 3 A The drainage system of Aozu. Sketch by Adoum Togoi from the author's notebook (Aozu, November 2, 2019). The inset shows Anner's sand drawing of the Yebbige-Omu junction (on the route, November 2, 2019). Photo by the author. Photo and sketch modified by the author. **B** The lower drainage system of the Taanua; the inset shows the Yebbige-Omu junction; both pictures correspond to Figure 3a. Source: Google Maps, modified by the author.

necessary, to adjust my approach. First steps towards genuinely collaborative research have been made by co-writing a paper with Mahama, a "local" scientist from Dirkou in Niger (Musch and Sedike 2019).

The results presented here are based on several periods of fieldwork totaling nine months in Chad and the Tibesti between 2017 and 2020. In particular, participant observation and data collection between 2019 and 2020 helped to produce the bulk of this study. When researching perceptions of space or orientation, I joined people as a co-traveler and engaged with them in conversations about environments we travelled through and about methods of wayfinding. Travelling thus became an important methodological tool. Travelling not only allows space to be experienced concretely, but it also provides opportunities when travelers are detached from everyday social relationships and constraints, and therefore have time for the concerns of the researcher (cf. Spittler 1998:30–31).

The concrete experience of space during travel was complemented by a "cartography" of space in the form of participatory ethnographic mapping done on the sand or in my notebook. However, the tool being used as well as the result was not a map, but mapping itself. As explained above, I understand the latter as a dynamic and always ongoing process (cf. Kitchin et al. 2009:1; Kitchin and Dodge 2007:331) in which I am engaged with my research participants. Mapping includes not only the drawing which may be produced but, it is constituted by actions like drawing, discussing, explaining, contesting, showing environmental features of the surroundings, etc., as also by the experience of travelling itself.

In particular, for ethnobiological and environmental science, participatory mapping can be an important tool for researching "environmental change and challenges" experienced by local communities (Gilmore and Young 2012:6) or ecosystem services (Hodbod et al. 2019). Both travelling and mapping are two elements of a whole: travelling is part of mapping and vice versa. All of the maps presented here were made in situ, except for the sketch of the Tibesti's drainage system (Figure 2a), drawn in Faya (Borku). I did, however, gather a similar but less complete sketch in Aozu, and in other locations, like Bardai, features of the drainage system were explained orally to me, which is also a kind of mapping.

In order to engage with people in the process of mapping in the given socio-cultural context, it is not necessary to ask them explicitly for drawings such as those reproduced here. When a local person tries to explain the environment to a foreigner, it is natural for him to draw a map, to comment on it, to discuss it with others, to show features of the surrounding environment, etc. Explaining issues by mapping seems

Figure 4 Engravings on the sandstone rock of Aozu (photo by the author). Inset: Satellite imagery of the greater Aozu area. Source: Google maps, modified by the author.

also to be the way that mapping practices are transferred to children.

Working by participant observation means, especially in a setting where the number of co-travelers is limited, one cannot "select" interlocutors according to preliminarily established criteria. The researcher has to engage with whomever happens to be there. Since such an enterprise takes place under the eyes of everyone, co-travelers point out those among them who know the environment best and who are experienced in wayfinding. These are usually adult men whose life experiences make them experts, like those listed here who drew maps for me: Anner Torso (aged about 50) is a merchant from Aozu who travels frequently between Libya and Bardai; Adoum Togoi (aged about 50), also from Aozu, spent his childhood herding camels and is now doing business in Aozu and Libya; and Mahadi Shahã (60–70 years old), born in eastern Tibesti, where Teda live close to Dõza, another Tubu-group, a recognized camel-guide with an excellent sense of direction, now cultivating his own garden in Faya (Borku). Others (see Acknowledgements) contributed to the research by more general information on Teda history and culture, by explaining further perceptions of space and time, or simply by confirming or nuancing what has been said by somebody else.

The ethnographic data obtained from these men was then supplemented by or triangulated with those of "academic" geography. This included a geographic map published by Dalloni after an expedition to explore the Tibesti in 1934. It is of course true that such a map played a role in colonial land appropriation, but it has the advantage that it contains a much larger number of (however often "Frenchified") toponyms than contemporary geo- or hydrographic maps. For the latter, I mainly referred to hydrogeological map sheets at the scales 1:500,000 and 1:200,000, the result of a joint project by the Chadian Ministry of Hydraulics and the Swiss Confederation, which are

freely available from the Internet (ResEau 2020). Remote sensing was also used, and satellite imagery with the usual Google Maps resolution for the area provides a sufficiently detailed picture of the terrain to resolve discrepancies between the drawings and hydrogeological maps.

Results

During travels, I frequently asked Teda about the extensive topography of the Tibesti, and they often put the accent of their explanations on hydrographic features. They unanimously explained me that the mountains drain in four main directions and that the watersheds originate at a volcano called Ēy Domma approximately in the center of the mountainous massif. On different occasions, two of them—Adoum and Mahadi—probably noticed that the abstractness of an oral depiction had to be completed by more concrete means. They picked up my notebook and my pen in order to map this hydrography on paper. This drawing was accompanied by a discussion between me and the respective research participants and interrupted by my own questions—an interactive process.

When mapping the watersheds in my notebook, Mahadi depicted them with a kind of cross (Figure 2a). He pointed out its axes and explained that they represent the watersheds, with their meeting point in the center of the cross. He marked the latter, as well as three important places (Bardai, Zoumri, and Mudroã), with a dot. In his drawing, the Tibesti mountains are symbolized by a kind of circle, which the four river systems leave. The latter end in four dry delta fans called Arrâĩ (NW), Taanua (N), Gererdu (SE) and Madagâda Tigi (S). They are symbolized on the map by circles. Mahadi also drew three lines that unite to form the Taanua but left them without comment. They are striking, because the sub-regional drainage basin of the Taanua in the following map of Adoum is in fact also made up of three local river systems, and the engraving on the sandstone block in Aozu also shows three lines.

An important element of the spatial understanding shown in Mahadi's map are the four dry delta fans into which the mountain rivers drain. As he explained after having finished his drawing, they have provided the Teda with rich grazing grounds for camel husbandry, which, due to limited resources in the mountains, would not have been possible on a large scale in the Tibesti itself. According to oral reports, the dry delta fan of the Taanua, for example, offered excellent grazing areas for centuries, but droughts since the 1970s and probably also warfare and landmines (Libyan occupation of the Aozu Strip in 1973; the Chadian-Libyan border war in 1986/87) seem to have caused many pastoralists to abandon this area. On the other hand, the two southern dry delta fans seem still to be well frequented by camel pastoralists from different Teda clans, as also by Tubu from other groups.

What is remarkable about Mahadi's map is that he did not draw the three calderas of Tarso Yega, Tarso Voon, and Tarso Toon, as well as the shield volcano of Tarso Tieroko, which are important in their dimensions and thus as markers (cf. Figure 2b). Rather, he located the meeting point of the watersheds at Ēy Domma, a relatively small geographical feature. As already mentioned, the hydrographic boundary between the Lake Chad basin in the south and the Mediterranean basin in the north runs in fact through this point. The watershed between two southern sub-regional drainage basins which drain into the dry delta fans of Madagâda Tigi and Gererdu also runs through Ēy Domma, and the watershed between the northern basins of Taanua and Arrâĩ is located just slightly north of this point.

Although the Tibesti can still be subdivided hydrogeographically into further sub-regional drainage basins, this Teda hydrography which only points out four of them is sufficient to include the most important valleys (in Tedaga: *enneri* [singular]) in terms of size and length, which also contain important settlement sites. These are the valleys of Zumri, Widinger, and Bardage (with the oases Zumri and Bardai) draining to the northwest, the valleys of Yebbige and Aozu (with the oases Aozu and Yebbi Bu) draining to the north, the Miski valley (with the oases Miski and, in its upper course, Mudroã) draining to the south, and the valleys of Šarda and Maro (with, in their upper reaches, the Gubon oasis and the medicinal springs of Soborom) flowing into the Soŋga valley and then draining to the southwest.

The second map (Figure 3a), drawn by Adoum, is part of a mapping process which took place in response to my questions about a map engraved in sandstone found in Aozu (Figure 4, described below). In order to explain to me how Aozu's people locate this map in a broader topographic context, Adoum—assisted by other locals, one of whom had shown me the sandstone engraving the day before—tried to explain to me the sub-regional river system that drains

into the dry delta fan of the Taanua. Again, Adoum, when feeling that the abstractness of an oral description was not sufficient, picked up my notebook and my pen and drew the present map.

A notable feature is the extreme abstraction of Adoum's map: the valleys and their tributaries, as well as their relations to each other and their geographical position, can only be roughly identified. As Adoum explained, his map allows us to distinguish three local river systems, all of which flow into the Taanua: on the right, that of the Yebbige with two of its tributaries, the Bru and the Omu. In contrast to the topographic map, on which the *enneri* Omu flows into the *enneri* Yebbige near the upper course of the latter, the two rivers join on the map only at the lower course of the *enneri* Yebbige. On the left, one can identify the river system of Aozu with the valleys of Aozu, Erbi, and Ndoge. In the middle, Adoum drew and named three valleys, which could not be exactly located on the geographic map despite extensive research. The satellite imagery shows in fact a third local river system draining into the Taanua between those of Aozu and Yebbige, but this soon disappears into a sandy plain. On Dalloni's (1934) map there is no such third river system, but it appears on the contemporary map of ResEau (2020). However, the latter indicates only the names "Togou" and "Sougouyi" for the valleys there, and not those Adoum mentioned. One of the latter (Oy/Oye) occurs in fact as a toponym near Ēy Domma in the far south of the Taanua drainage basin.

The inset of Figure 3a shows a strip map drawn in the sand. This map was made by Anner, who was driving our car back from Aozu to Bardai. I had asked him about our exact location. He thus explained orally, by the help of the map and by gestures towards the surrounding mountains and valleys, that we had left Aozu in a south-easterly direction, travelled along the *enneri* Yebbige, and then turned east into the *enneri* Omu. Anner's sand drawing reproduces "realistically" the slight curves of the *enneri* Yebbige and the *enneri* Omu pointing to the east.

The last map presented here (Figure 4) is a possibly "prehistoric" engraving at the southern end of Aozu village, where the path leads to the nearby date palm grove. Three separate lines are engraved on the horizontal surface of a sandstone rock; next to them are inscriptions in Arabic script probably from the last decades and the drawing of a camel. In the immediate vicinity of the rock are further engravings, mostly on vertical surfaces, whose variety of themes suggests that they come from very different periods of Saharan rock art (camels, giraffes, human representation, and, further away, cattle), and thus may be between 2,000 (the earliest for camels) and perhaps 9,000 or more (for giraffes) years old (cf. Le Quellec 2013). The age of the map can hardly be determined. The collective memory of Aozu's inhabitants has neither retained the occasion for which this map was made, nor any of the times when it might have been used.

Looking at the map, one notices the prominent bend of one of the two outer lines, which makes it possible to identify it as the *enneri* of Aozu. The latter, after having left the oasis, runs first to the northwest and then turns to the northeast. The other two valleys probably represent the *enneri* Erbi and the *enneri* Ndoge. This hypothesis is confirmed by inhabitants of the oasis stating that the engraving represents the local river system of Aozu. However, the hypothesis that it represents not the local river system, but the sub-regional one of the Taanua with its three confluents (as it is shown on Adoum's map and perhaps by the three unexplained lines on Mahadi's sketch) cannot be completely excluded.

What was the use of the engraved map of Aozu's valleys? As nobody remembers when and how it was created or used, there are two hypotheses: either the map was used in order to explain the topography to travelling foreigners, or it served as a support in order to materialize claims on valleys made by different groups, as discussed below.

The engraved map is highly abstract, and the lines end before they join. According to the map's orientation in situ, the confluence of the valleys takes place in the west and not, as is actually the case, in the north. However, this may have something to do with the surface texture and orientation of the rock or with the engraver's own understanding of his work. Even when contemporary sand maps are drawn, often no attempt is made to have points on the map match geographical points. Thus, the map on the ground may be drawn so that the area showing north actually lies to the geographical east. Such correspondence, however, is always conserved when, after giving the abstract explanation with the help of a map, the way is explained to the traveler with the outstretched hand and through references to landmarks and time (cf. Musch 2015).

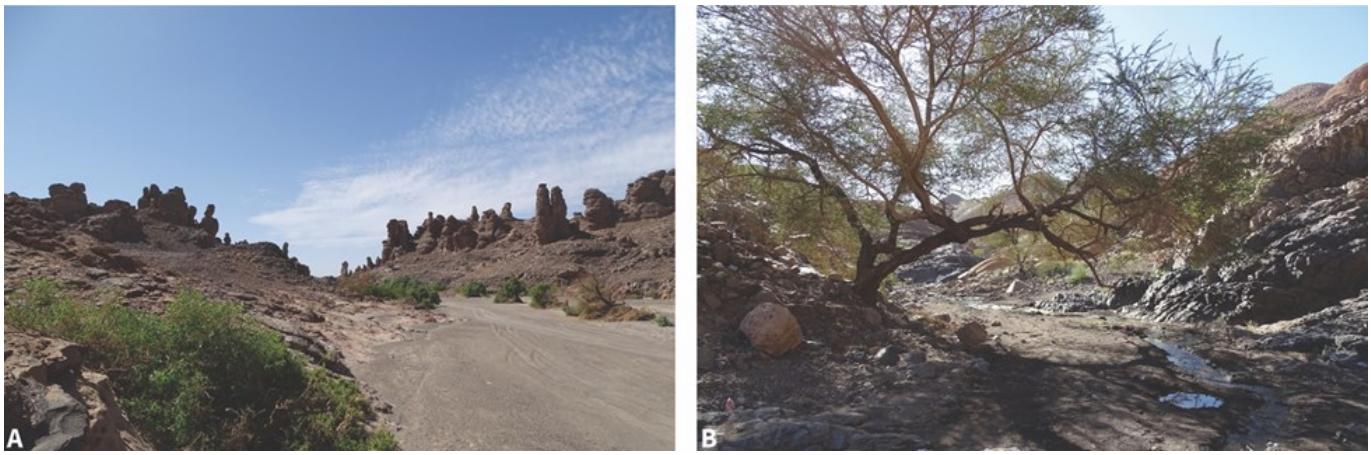

Figure 5 Two examples of valleys in the Tibesti: **A** the *enneri* Zumri, **B** a small mountain valley near the village of Gubon.

Discussion

Mapping is one of the practices of human spatial experience. The manifold examples of "prehistoric" maps in rock art (e.g., Delano Smith 1982; Doolittle 1988:46–47) allow the hypothesis "that humanity was making maps prior to the invention of writing or even to the Agricultural Revolution" (Stea et al. 1996:351–52). It seems difficult or impossible to date the engraved map of Aozu. However, the fact that local collective memory does not retain any idea about its creation and use allows us to conclude that the engraving is very old. Its similarity to current sketches of river systems suggests that there may be a continuity in the perception of space through the representation of water.

The extreme abstraction of the Teda's maps allows us to compare them with similar attempts to represent space, made by completely different cultures, such as "stick-charts," made of sticks tied together (Wise 1976:15), or "strip map[s]," in which lines are drawn into the substrate (Burland 1947:288; MacEachren 1986). Such maps have neither scale nor indications of orientation or a frame of reference (Golledge 1999:13), but depict space in a way that "anyone knowing the country" could understand which specific features are being referred to, as Burland (1947:288) states in regard to similar representations of river systems. The latter statement must, however, be put into perspective. In fact, a finely calibrated orientation is hardly necessary if a traveler follows a river, because the topography already gives the direction, and a deviation from the path should only rarely occur. This could be an explanation why all maps of river systems shown here for the Tibesti are highly abstract.

In the introduction, I underlined that the *graphy* of water is not principally a cartography of watercourses, but "the holistic and dynamic mapping of environments, which include different kinds of topographic features, non-human beings, natural resources, and ways to travel through." The examples given show what is meant by such a "holistic and dynamic" mapping.

Hydrographic knowledge forms the basis for knowledge of the occurrence, use, and ownership of natural resources, which is all the more important where such resources are scarce. In fact, the valleys (Figure 5) represent a topographical feature of particular interest to the local population because they harbor natural resources. In many valleys, as well as in their dry delta fans at the edge of the mountains, grazing land is found. In other valleys, date oases and oasis gardens exist, and, in the past, wild fruits, such as those of *Citrullus colocynthis* (*awur*), *Aristida pungens* (*moyugu*), *Panicum turgidum* (*guši*), and others, as well as firewood, mainly from *Acacia tortilis* ssp. *raddiana* (*tehi*), also represented important resources. For this reason, valleys are regarded by Teda groups as their respective territories (Baroin 1988:205). Furthermore, since 2013, gold, found in placer deposits of the valleys, has become an important resource of the Teda. In this contemporary case of resource exploitation, the ownership of a valley still belongs to a particular group.

Mahadi's explanation does not primarily have the abstract goal of describing watersheds in the Tibesti. Rather, his purpose is to explain where rivers and riverbeds lead: to the rich grazing grounds that allow the keeping of large camel herds in places close to the mountains. Similarly, the exact knowledge of the sub-

regional and local river systems that the former herdsman Adoum possesses does not serve as abstract hydrography, but implicitly includes knowledge of where resources can be found and who can harvest them.

Valleys are also important because they represent travel routes for the highly mobile Teda (cf. Chapelle 1982:172–176). They do not only allow orientation in space, but rather provide a navigable terrain in often impassable mountains. Thus, in an *enneri* a pedestrian, a camel rider, or, in many places, also a car, can move relatively easily. And there is a strong link between ownership over and social organization of natural resources in space on the one hand and the ability of travelling through space on the other. As I have shown in a prior paper, the claim on scarcely or not-at-all-inhabited desert spaces is not made through permanent presence, but through the ability to travel in such spaces, including the capacity of orientation (Musch 2017).

Traveling in valleys is what we did when returning with Anner from our visit to Aozu along the *enneri* Yebbige and the *enneri* Omu. In the latter, I asked Anner to explain to me where we were traveling. Thereupon he drew for me the map in the sand and commented on it. What is important is not the sand-map itself, which the wind will soon blow away, but the context of action where mapping becomes a dynamic tool based on the sand-*graphy*, on speech, gestures, and on surrounding environmental vistas. One can imagine cases where the way is less evident or where different alternative ways are available that have to be discussed by the travelers. Then mapping becomes a much more interactive and dynamic process.

One may think that the engraved stone map can serve as an example for a fixed map and that it may be difficult to speak of "mapping" in this context, since we do not know the circumstances under which it was created. However, two peculiarities allow us to place the map in a context of action. First, it is so abstract that it is of little use to allow orientation in space or to materialize claims of ownership without oral explanations and discussions. One can therefore imagine that travelers discussed their route by means of this map, or that they asked locals for explanations, or (in the case that the map materialized claims of ownership), that it was a device used to discuss collectively the access to and the use of valleys by different groups. In this way the engraved stone map was always actualized anew through processes of mapping. The map Adoum drew in order to explain the stone engraving to me is an example of such an actualization of this map in a context of action, and the participatory mapping carried out with Mahadi is another example of how a well-established cartography is actualized in an interactive context of mapping.

One can also state that the "prehistoric" map is apparently located in a prominent place where artists left their engravings as long as 9,000 or more years ago, and where people are still applying graffiti. The neighboring engravings of giraffes, cattle, camels, and the contemporary graffiti in Arabic script can all be seen as representations of changing natural and social environments (humid savannah, steppe, desert, and the closeness to contemporary Libya). Such representations of environments can be considered as the "appropriation of landscapes by means of rock art" (Lenssen-Erz 2012) done by mobile people, which is close to the above mentioned appropriation of wide desert spaces through the ability to travel through them and knowledge of their orientation. The rocks where the map and the other engravings can be found could thus embody a millennia-old and still-ongoing process of mapping which is holistic in time and space.

Environments are not stable, but change, due, for example, to seasons, global climate, social action, or just the different ways in which people represent them. An ethno-hydrography, as I have outlined it, is thus based on processes of mapping rather than on fixed maps. The main topographic features on which ethno-hydrography relies are rivers and valleys (though in other geographic contexts they may be oceans, lakes, etc.). However, the focus in ethno-hydrography lies not on water itself, but on how the water organizes environments. Ethno-hydrography thus aims to provide keys to how people understand their surroundings through the *graphy* of water in a given space.

Acknowledgments

I would like to thank all the Teda with whom I am carrying out my research for their always great hospitality. For information and support when preparing the present paper, I thank especially Mahama Abalaiyi, Djiddi Allahi, Hitti Allatchi, Senoussi Koki, Mahadi Shahã, Djiddi Tchagam, Brahim Tchouma, Adoum Togoi, Anner Torso, and Souleymane Yaya. I would also like to thank Chadians

and Chadian institutions for their hospitality and cooperativeness. Not least, I thank the German Gerda Henkel Foundation which since 2018 has financed my research among the Teda, and Norm Mundhenk for improving the language of the present text.

Declarations

Permissions: Written research and travel permits from the Republic of Chad. Oral permissions from local chiefs, elders, and commoners to whom research is always presented in a preliminary form.

Sources of funding: Gerda Henkel Stiftung, Germany.

Conflicts of Interest: None declared.

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