



O U E N A T

Defining a World Heritage in the Heart of the Libyan Desert

a joint project of
UNESCO WHC   
and Heinrich Barth Institute e.V.

in support of
Libya, Egypt and Sudan
in their combined efforts
for the inscription of Jebel Ouenat as
»Transboundary Cultural Landscape«
into the World Heritage List

Description, assessment and comparative evaluation of the natural and cultural values of Jebel Ouenat

by Rudolph Kuper

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1) *The western side of Jebel Ouenat*

1. Description and assessment of the specific natural and cultural values of Jebel Ouenat

1.1 Introduction

1.1.1 Ouenat – Island in an Ocean of Dryness

Situated at the border of Libya, Egypt and Sudan and being clearly defined by its unique geological features, Jebel Ouenat – as an “Inselberg” – constitutes the most prominent landmark within the vast, waterless plains of the Libyan Desert. With its peak rising more than 1800 metres, it includes the highest point in the Eastern Sahara and thus provided favourable ecological conditions during past phases of climatic history up to present day’s hyper aridity. This is attested by the continuous presence of a rich fauna and flora almost extinct elsewhere. The permanent availability of water attracted human occupation since prehistoric times, particularly in that important phase, between 10,000 and 5,000 BC, when favourable cli-

matic conditions in the Sahara enabled the development of the first African cattle herding societies. At the end of this humid phase, after 5,000 BC, the aridification of the Sahara and the consequent movements of people towards the Nile Valley and the Sub-Saharan areas set in motion the processes which led to the development of the Egyptian civilisation and the great African migrations. This ancient occupation is reflected by rich archaeological evidence, especially by a wealth of rock paintings and engravings, that provide a vivid insight into the people’s daily life, their culture and their struggle against an increasingly harsh environment. Known only to a small extent these unique heritage makes Jebel Ouenat one of the world’s most important centres of rock art and – together with the undisputable scenic beauty of the mountain – serves as a great attraction for tourists.

1.1.2 Workshop 2004: A Transboundary Cultural Landscape of 3 countries

Because of its remoteness and fragility, however, this precious heritage is endangered by a variety of threats, including the growing tourism business, poaching, military activities etc. The lack of an adequate conservation policy for a site which lies thousands of kilometres from the capital cities and across the borders of three countries, add to the challenge of preserving this extraordinary patrimony of humanity. The World Heritage Committee has repeatedly stressed the need for a more balanced and credible List, truly representative of the great variety and diversity of the world's cultural and natural heritage. Among the "less-represented" sites is certainly the desert landscape of the Sahara and the cultures that have developed in it over the millennia. The Jebel Ouenat, at the border between Egypt, Libya and Sudan, seems to embody the above-mentioned characteristics, both in terms of value and conservation issues. The World Heritage Centre, therefore launched an initiative to mobilise the regional and international expertise and sensitize the three concerned countries on the need to further document and protect the exceptional heritage of Jebel Ouenat.



2) UNESCO Workshop 2004 in Tripoli and Jebel Oenat



3) UNESCO Workshop 2004: The steering committee

4) The members of the Workshop at Jebel Ouenat



So, by support of the Italian Embassy, Tripoli, in March/April 2004 the World Heritage Centre of UNESCO in cooperation with the Libyan Department of Archaeology and the Heinrich Barth Institute e.V., Cologne, has carried out an international "Workshop on the Conservation and Management of the proposed Jebel Ouenat protected area". The objectives of the workshop, which lasted for one week and included a three-day visit to the site of Jebel Ouenat, were two-fold:

Assessment of the values and conditions of the Jebel Ouenat and validation of the **feasibility of a trinational initiative** for the development of appropriate protection mechanisms and the possible future **nomination of the site for its inclusion, as a tranboundary property of Libya, Egypt and Sudan, into the World Heritage List.**

The workshop resulted in a comprehensive "Technical Report" including a number of recommendations for the necessary steps to ensure appropriate legal protection of the cultural and natural heritage of Jebel Ouenat. Therein it was proposed to establish multidisciplinary work groups within each country (A) as well as a tri-national Coordinating Committee to steer the implementation of these recommendations (B). **As a first step the single-country sectors of the area should be included into the Tentative Lists of Egypt, Libya and Sudan** (C) and in preparation of this, a comprehensive survey of the natural and cultural resources should be carried out on the three sides of the mountain, in order to document the extent, significance and state of conservation of the natural and cultural heritage of Jebel Ouenat (D).

As a first step towards these goals in January 2007 the Egyptian Prime Minister has declared the Gifl Kebir region, including the Egyptian part of Jebel Ouenat, a protected area named “Gifl Kebir National Park”. Now it is the turn of Libya and Sudan to declare their parts protected. Under this perspective a meeting was organised in the UNESCO office at Cairo on December 18th 2007, that, however, did not receive the expected declarations, but encouraged a continuation of the process and a follow up meeting to be held possibly at Benghazi in Libya.

1.2 History of research

Due to its extreme aridity and the lack of routes and roads, the central eastern Sahara, the so called Libyan Desert, has been completely unexplored until the first part of the 20th century. The first who crossed a part of the area was the Egyptian diplomat Ahmed Hassanein Bey who in 1923 on his caravan journey from Kufra to Darfur reached Jebel Ouenat (HASSANEIN BEY 1925). There he met a group of Goran herdsmen, who at that time still found sufficient pasture in the valleys of the mountain. In his report we find the first photographs of rock pictures that later made the area so famous.

The next to arrive there was the Egyptian explorer Prince Kemal el Din. On his expedition from Kharga to Ouenat in 1925, carried out by Citroen caterpillar vehicles, he was the first to see the eastern escarpment of the Gifl Kebir plateau and coined its name, meaning “The Big Cliff”, however without visiting it (KEMAL EL DINE HUSSEIN 1928). The beginning of the 1930’s saw a rather rapid increase in the exploration of the Libyan Desert, facilitated by the introduction of Ford A model motorcars that had been especially adapted to the demands of the desert. Geologists like John Ball and the surveyor Patrick Clayton mapped large areas between the Mediterranean and the Sudanese border including Gifl Kebir and Jebel Ouenat. Young British officers spent their free time and private money in desert exploration. The most famous and successful among these was Ralph Bagnold, who in 1938 also carried out the first interdisciplinary expedition into the Gifl-Ouenat region, focussing on archaeology (BAGNOLD et al. 1938). During this mission also the highest peak of Ouenat was climbed for the first time and its elevation fixed as 1,893 m a.s.l.

Also in the 1930ties the Hungarian count Lazlo Almasy, recently made famous by the film “The English Patient”, was especially on search for the mythical “lost oasis” of Zerkura and discovered among other rock art sites the so called “Cave of Swimmers” in Wadi Sura in the Gifl Kebir and the paintings of Ain Dua at the Western side of Ouenat (ALMASY 1936; 1939). In 1933 he guided there the German scholars Leo Frobenius and Hans



5) Map of Northeast Africa of 1922 with the position of Ouenat



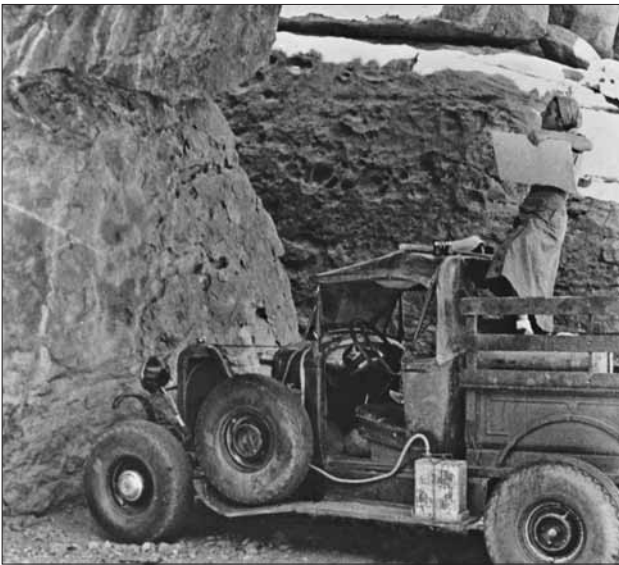
6) Ahmed Hassanein Bey, the first visitor to Jebel Ouenat in 1923

7) Rock engravings in Karkur Talh. Photo by Hassanein Bey



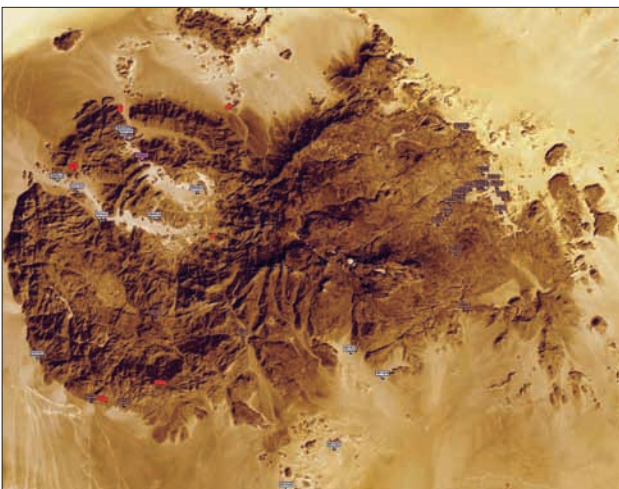


8) Hans Rhotert, Lazlo Almasy and Leo Frobenius (l.to r.) 1933



9) Elisabeth Pauli copying rock art at Karkur Talh in 1933

10) Satellite image of Jebel Ouenat



Rhotert, who in 1934/35 carried out an extensive scientific expedition into the Libyan Desert, that resulted in a comprehensive documentation of the rock art of Jebel Ouenat and Gifl Kebir (RHOTERT 1952). During the war the area was the domain of the British “Long Range Desert Group”, founded by Ralph Bagnold, and only once crossed by Almasy when he brought two German spies from Libya to the Nile. The main scientific activity in Jebel Ouenat after the war was an interdisciplinary Belgian Expedition working there in autumn and winter of 1968-69 and resulting in comprehensive studies of the geology (DE HEINZELIN et al.1969), the fauna (MISONNE 1969), and the flora (LEONARD 1969) of the mountain and enlarging the number of known rock art sites to more than 4000 (VAN NOTEN 1978). During the last years this number has considerably increased by discoveries of amateurs and tourist groups (e.g. LE QUELLEC 1998; MENARDI-NOGUERA & SOFFIANTINI 2008) that to a large extent have been compiled in the Internet by A.Zboray (ZBORAY 2005).

1.3 Geology and Landscape

Jebel Arkenu, Jebel Ouenat and Jebel Kissu – although “discovered” only in 1923 – are the most prominent and highest features of the entire Eastern Sahara, lying in the border zone of Libya, Egypt and Sudan. The northwest – southeast aligned mountains (and neighbouring less elevated structures) own their existence to ancient plate-tectonic movement and locally stable “hot spots”, which are melting spots below the lithosphere (mantle plumes), persistent for tens of millions of years.

Jebel Ouenat is located exactly on the junction of the border lines and stands out like an island from the surrounding alluvial plains. At the same time, it marks the centre of the Earth’s largest hyper-arid region. Geologically and morphologically, the mountain consists of two different parts. The western part, entirely lying on Libyan territory, includes the largest and best exposed of the so-called ring complexes, representing the eroded remnants of a large granite dome with a diameter of 24 km formed about 50 million years ago. It essentially consists of rocks ranging in composition from granites to syenites. Weathering of these plutonic rocks resulted in the formation of gigantic boulder-like forms, tens of meters in diameter, that create the spectacular scenery of the western side of the Jebel. The inner parts being less resistant to erosion than the outer ones, the core of the ring complex has been exposed providing an amphitheatre-like landscape, and leading to the formation of the two major valleys, Karkur Idriss and Karkur Ibrahim. These are only divided by a small watershed from each other and drain the interior towards the Northwest.

The eastern part of Jebel Ouenat (named Hassanein plateau) lies on Sudanese and Egyptian territory, and consists of a large block of palaeozoic to mesozoic sandstone propped against the granite uplift to the west. It comprises the highest peak of the entire mountain reaching about 1930 m above sea level. Three minor plateaus superpose the main plateau, which in the south is limited by a huge vertical cliff dropping over 500 m. The plateau is dissected by several canyon-like valleys. The largest one, Karkur Talh, winds for some 25 km through the sandstone to finally open to the vast sandy plains flanking the mountain to the northeast. A shorter valley, Karkur Murr, drains the plateau to the south.

A most curious geological feature, strikingly figuring as a bright patch on satellite imagery, occurs on the less dissected part of the sandstone plateau. It is a deep circular depression with vertical cliff-like walls, about 350 metres in diameter and covered by sand. It is not clear yet whether it is an ancient impact crater. Research is also needed to investigate its bottom which is most promising as a unique sedimentary archive for palaeoclimatic studies.

The altitude of Jebel Ouenat attracts some precipitation from the clouds that occasionally reach this hypercontinental position. Even if decades may pass without rainfall – the last and exceptional one was recorded in Winter 2007, leaving on the plateau large gueltas filled with water – it is sufficient to support the permanent springs at Ain Zueia and Ain Dua, the rock pool of Ain el Brins in Karkur Murr, and the vegetation and wildlife in the larger valleys.

Jebel Arkenu lies on Libyan territory, about 20 km to the northwest of Jebel Ouenat and beyond a large dune field called “Arkenu dune” that was formed between and aerodynamically diverted by the two mountains. The oval structure has a diameter of 25 km and resembles in several aspects to Jebel Ouenat, excepting its lesser altitude of about 1440 m a.s.l. The mountain also includes two geological and morphological units. Its more extended southwestern part consists of a ring complex that apparently is about 10 million years older than the one at Jebel Ouenat. The broken interior part, which also features the impressive giant rock scenery, is drained to the south by one major valley. The northeastern part is composed of strongly eroded remnants of sandstone partly overlying the periphery of the granite dome. Much of this part of the mountain remains unsurveyed. Owing to its lesser height, the mountain attracts significantly less rainfall than Ouenat, resulting in only one impermanent spring at the head of the main valley and comparatively sparse vegetation.



11) Granite formation in Karkur Idris



12) Rock shelters in granite boulders

13) Sandstone formation in northern Ouenat (Winkler's site 72)





14) Rain dependant vegetation in the western foreland of Jebel Ouenat



15) Vegetation in Karkur Ibrahim

16) Guelta on the Hassanein Plateau after rains in 2007
(Foto: A.Zboray)



Jebel Kissu is situated on Sudanese territory, 25 km to the southeast of Jebel Ouenat. Its steeply rising morphology with the peak reaching approx. 1730 m a.s.l. makes it a spectacular land mark recognized from far distances. Very little is known on the origin, age and structure of the mountain, which has remained one of the least explored sites of the entire Sahara to the present day. According to scarce geological observations, the spectrum of rocks is extremely varied.

1.4 Ecology

The area of the three mountains harbours 87 known phanerogamic plant species, which also marks it as a “hot spot” of biodiversity, regarding the highly impoverished flora of the surrounding extreme desert. The biotic richness is partly due to the diverse habitat conditions within this highly dissected massif, but also to its geographical position at the border line of contrasting floristic regions, showing influences of both the northern *Holarctis* and the African *Palaeotropis* from the south.

The prevailing ecological conditions are characterized, among others, by the extreme aridity and the harsh temperature regime. Rainfall, hardly exceeding 10 mm per year at the base level of the mountains, coming aseasonal, in irregular intervals and with very large inter-annual variability, imposes a severe stress to all organisms without access to permanent groundwater. In addition, although situated as far south as latitude 22°, there is a high risk of frost occurrence during wintertime, which limit the distribution of certain sensitive species of tropical origin. This is even more accentuated at higher altitudes, where the average temperature is several degrees lower and the temperature amplitudes are higher than in the surrounding plains.

The distribution of both, the life forms as well as the represented plant families within the flora, indicates the special adaptations to the prevailing climatic conditions. A high proportion of the flora belongs to the type “potential annuals”, also called “plurisaisonnières”, plants with a very variable life cycle depending on the available water resources. The Saharan element constitutes an important part within the flora and shows an increasing influence at higher altitudes. The link to the tropical African flora, however, dominates the vegetation of Jebel Ouenat, especially the East African element originating from the Somalia-Masai regional centre of endemism. The influence of the Mediterranean and the Irano-Turanian floras on the Jebel Ouenat flora is rather weak. In general, the species richness in relation to the area is by a factor three higher in Jebel Ouenat than in the Ennedi, a mountain range situated app. 600 km south of Ouenat already at the northern fringes of the Sahel.

The vegetation of Ouenat has been surveyed and classified into several communities or types depending on substrate, altitude and presence of open water. In contrast no detailed study has yet been carried through on the fauna, nor on ecosystem characteristics such as the food webs and plant-animal interactions in the region of Jebel Ouenat. It has been observed, however, that about half of the plant species are regularly browsed by animals, while many others show adaptations against herbivory (spines, latex, etc.). A fairly high number of Gazelles (mainly *Gazella dorcas*) and Moufflons (*Ammotragus lervia*) have been noted.

The present state of these populations is unknown. Information on the productivity of desert plants, especially of shrubs and trees in extreme arid environments such as Jebel Ouenat, is lacking. Visualising the increasing pressure by human activities upon this region in the next future, research on that topic would expand our knowledge and could guarantee sustainable land use such as eco-tourism even under desert conditions. However, the available botanical evidences suggest that Jebel Ouenat has unique ecological and floristic features, which remained mostly intact and undisturbed by man until today.

1.5 Human Occupation

Jebel Ouenat is situated in the core of the Libyan Desert, the driest warm desert on earth. This vast region of the size of Western Europe makes up the by far largest part of the eastern Sahara and is, outside the few groundwater fed oases, void of any human occupation. Countless archaeological remains, rock paintings and engravings, however, give witness of former rich human life under obviously more favourable ecological conditions. These have been solely dependent on rain and thus archaeological remains can directly serve as relevant indicators for climate change. Under this respect since 1980 the University of Cologne has carried out interdisciplinary research into the interrelation between man and environment within the framework of its projects B.O.S. and ACACIA. With its different types of landscapes – sand sheets and rocky plateaus, dune seas and vast hammadas – the Libyan Desert can serve as an ideal laboratory for climatological studies and provides unique opportunities for research into the interrelation between man and environment, in particular the specific influences of the summer- and winter rain belt on human occupation. The results available from this research (KUPER & KRÖPELIN 2006) allow us to draft a scenario of environmental and cultural development during the Holocene period of north-eastern Africa, where – situated in its focus, but far from the centres of history – Jebel Ouenat may be regarded as a mirror reflecting all its essential stages during the past 10,000 years. (Fig. 27)



17) Northern Ouenat: People and cattle at Winkler's site 72



18) Northern Ouenat: (Dancing?) couple at Winkler's site 72



19) Engraving of cattle at Karkur Talh

20) Engraving of giraffes at Karkur Talh (comp. Fig. 7)

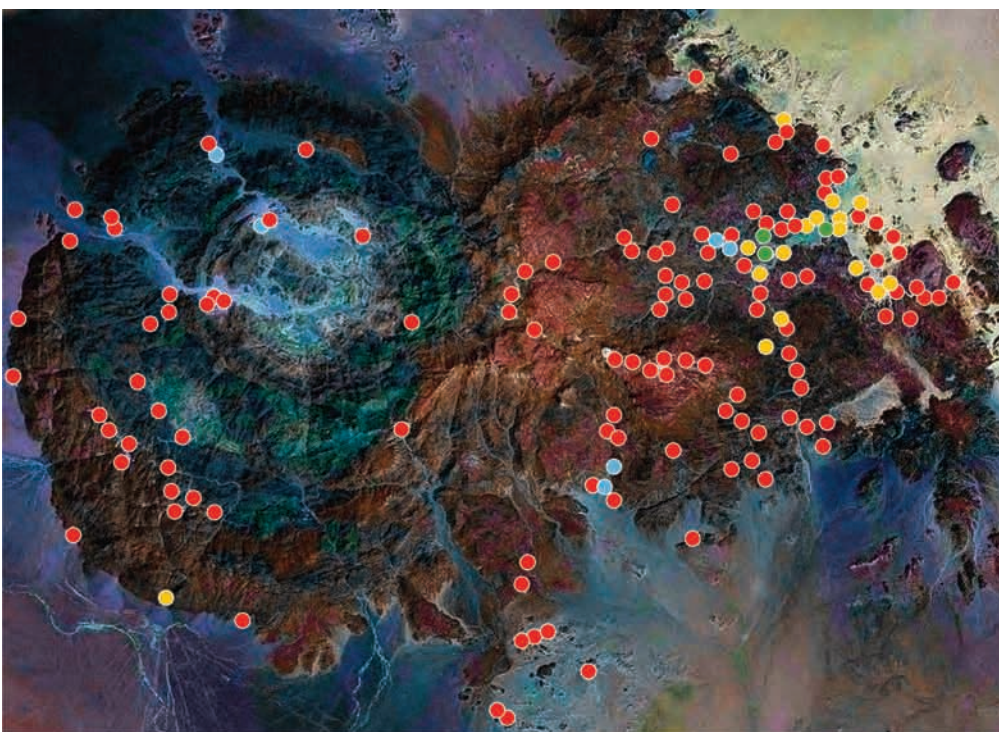




21) Karkur Talh: Archers fighting for a cow.

After a period of several ten thousands of years, when the Sahara was dryer and more extended to the South than today, during the 9th millennium B.C. a monsoonal rain front coming from the South turned the Libyan desert into a savannah like environment. This soon was occupied by animals and Man, who as hunter and gatherer made use of this vast new habitat. After the phase of reoccupation, human life changed again during the 7th millennium B.C. by the introduction of domestic stock that then gradually turned foragers' livelihood into a multire-source pastoralism.

The breakthrough of cattle herding as a main economic base obviously was stimulated by the new spreading of the desert when after 5,000 B.C. rains ceased in the northern part of the Sahara and people had to retreat to favourable areas like Jebel Ouenat, the Sudanese regions further South and the Nile valley, triggering finally the great African migrations and the rise of the Egyptian civilisation. This crucial phase in the history of mankind, when an increasing arid environment challenged human adaptation and led to the development of specialised cattle pastoralism as the vital human subsistence strategy in more than one third of Africa, is especially well documented in the rock art of Jebel Ouenat. Its interpretation, however, calls for detailed studies and complementary archaeological excavation mainly with regard to its dating and environmental reconstruction. The pictures clearly demonstrate the different



22) Rock art sites in Jebel Ouenat (compiled by Andreas Zboray)

lifestyles changing over the millennia, from cattle keepers over iron age goat herders and hunters to camel leaders. The most recent discovery of an hieroglyphic inscription in the Sudanese part of Ouenat even proves that during the pharaonic period this remote area was included into a net of communication and control reaching as far as into the interior of Africa (CLAYTON et al. 2008). Modern history is first represented in 1931 by colonial Italy installing an outpost at Ain Dua after having caused the disastrous flight of thousands of Senoussi from Kufra to Ouenat only a few of which could manage to continue to Dakhla oasis in Egypt (ALMASY 1997: 201-209). In the year 1933 also the British “Sudan Defence Force” established a short termed outpost at Ain el Brince in Karkur Murr, where the drystone walls of its buildings represent the youngest archaeological remains of Ouenat. At that time Ouenat still used to be visited seasonally by Tubbu herdsmen from Chad, who besides their camels and goats even drove some cattle there. This habit is reported sporadically until the 1950s, demonstrating that Ouenat for long continued to serve as a favourable location within a deteriorating surrounding. That this tradition until now still seems to be alive among tribal groups in the South has been demonstrated most recently when bandits kidnapped a tourist group at Jebel Ouenat in September 2009, proving their ability to cross vast distances of barren desert with a minimum of supply.

Already in his book describing the first visit to Jebel Ouenat in 1923 Ahmed Hassanein Bey gives a detailed account on his discoveries of rock engravings, examples of which are also shown in photographs. Many of the later exploration reports from the area added considerably to the knowledge about pre-historic paintings and engravings in different parts of the mountain, but only two scientific monographs have been published so far: one presenting the results of the Frobenius-Expeditions of 1933/35 (RHOTERT 1952), the other the documentation done during the Belgian mission of 1968-69 (VAN NOTEN 1978). But still today evidence is growing, predominately from the upper regions of the mountain (mainly discovered by tourists and published in the internet) and confirming Jebel Ouenat’s first rank among the art centres of Africa (ZBORAY 2005).

Due to the different technical preconditions offered by the respective geological structures of the mountain, in its Western part only paintings occur, while in the Eastern sandstone region also engravings can be found. While paintings predominantly are preserved on the ceilings and walls of shelters built by spectacular granite boulders, engravings mainly occur on open rock surfaces. As for the engraving technique there obviously no chronological limitation exists. Pictures of hunting scenes and cattle are as well to be found as people with iron



23) Karkur Talh: Family scene



24) Karkur Talh: People and cattle



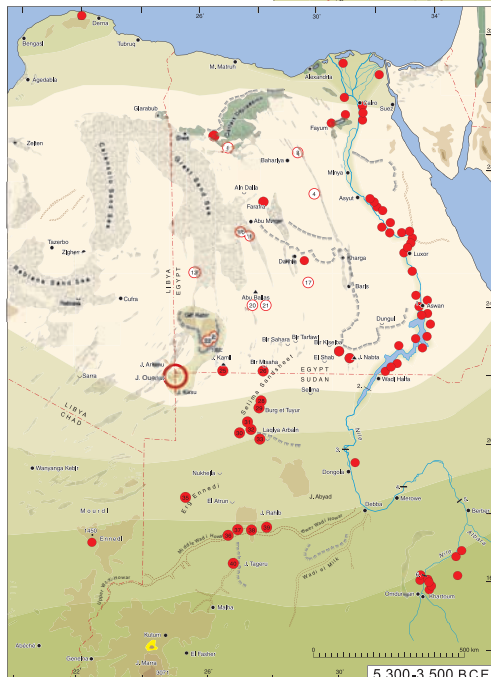
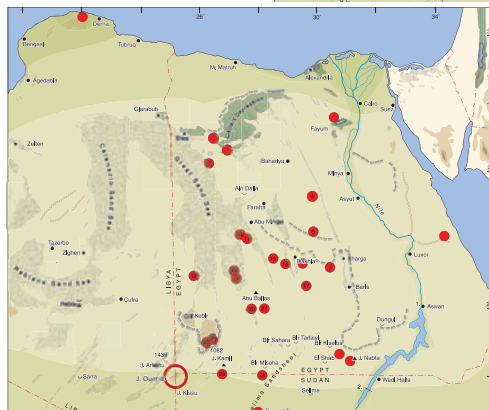
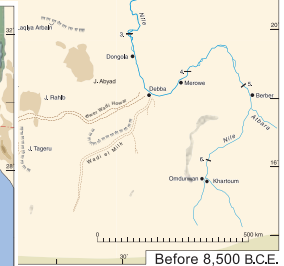
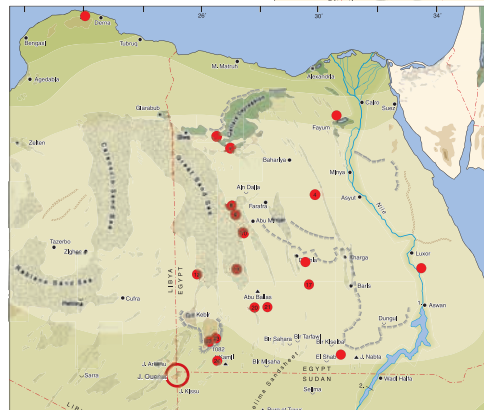
25) Karkur Ibrahim: Band of dancers

26) Herri, “King of Ouenat”, chief of the last Goran tribesmen in Ouenat in 1923



More than 10,000 years ago the Sahara was more extensive and drier than today. It was only in the vicinity of the Nile Valley that people could live as hunters, gatherers and fishers. The map shown here suggests a concentration of settlements in the area around the Aswan reservoir, which is, however, due to the numerous archaeological activities in connection with the building of the dam.

10,000 years ago monsoon rains from the south transformed the desert in a relatively short period of time into a savannah landscape. Animals and humans followed. They lived as hunters and gatherers but brought pottery technology with them, one of the most important of human inventions, which apparently evolved on the southern periphery of the Sahara independently of other centres.



8,000 years ago there was a fundamental change in the way of life of people in northeastern Africa. Sheep and goats were introduced from the Near East and the former wild cattle native to Africa became the most important domesticated livestock. The hunters became nomadic herdsman, though not farmers. There was no necessity for agriculture as the savannah apparently provided still an adequate supply of wild grain.

6,000 years ago the desert again spread in the north. The settlement pattern was reversed. Large areas of western Egypt were abandoned by herdsmen who could only survive further south and in a few areas with favourable conditions. At the same time, the first peasant villages from which the Pharaonic Civilization evolved around 3,000 BC, were founded in the Nile Valley.

27) *Main Phases of environmental change and human occupation around Jebel Ouenat during the Holocene.*

weapons. In opposition to this, paintings mainly seem to reflect the cattle period. Stylistic differences and the spectrum of themes are considerably wide. They range from naturalistic and schematic representations to geometric and symbolic figures, thus suggesting an extended range of time and people. The same is true for the topics depicted, representing impressive single figures besides vivid scenes of peaceful and antagonistic action, promising insight into the daily life of past societies as well as into their spiritual world. But most of the pictures are still awaiting detailed documentation as a base for statistical analysis and appropriate interpretation.



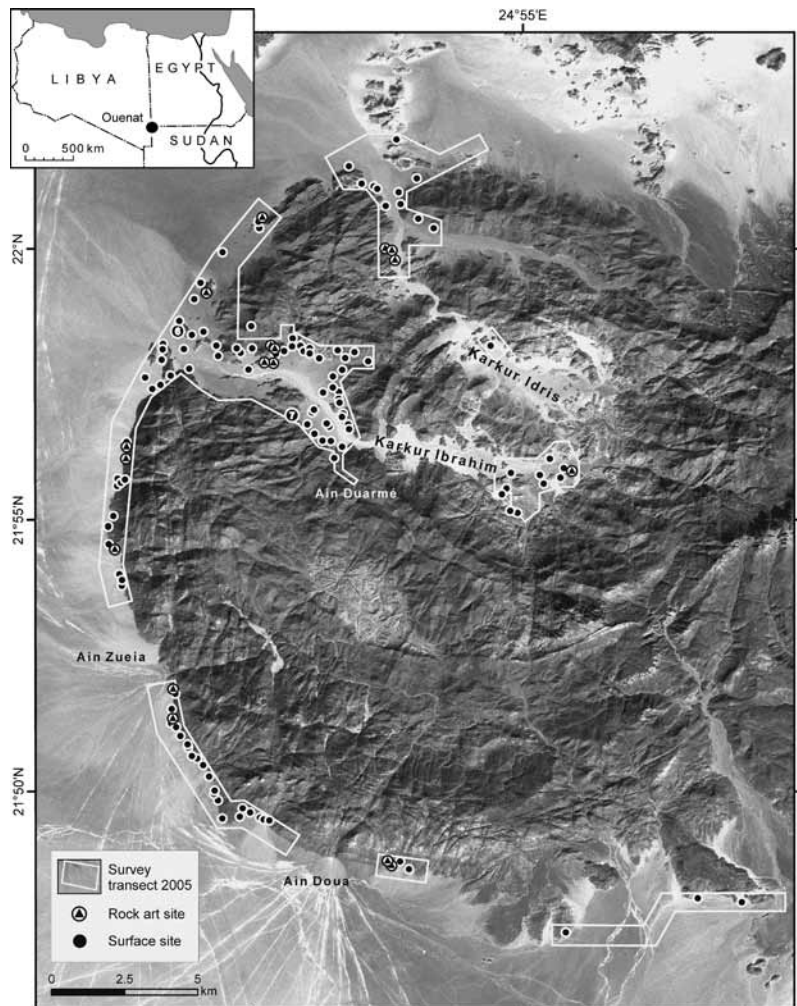
28) Karkur Ibrahim: Cow giving birth

Concerning the chronological framework for the long lasting development of subsequent occupation phases – as to transfer from adjacent areas like the Gifl Kebir and suggested by the evidence from rock art, – spanning from early Holocene hunter gatherers over cattle herders and iron age people to caravan traders, an essential deficiency is marked by the lack of archaeological excavations carried out up to now. This includes the missing of archaeo-botanical, -zoological and -geological evidence necessary for reconstructing the respective environmental conditions that determined the human way of life. Archaeological remains, however, such as stone artefacts and pottery, have been mentioned in several reports, (in the late 1930s competitions in collecting grinding stones are said to have taken place among British soldiers!) and meanwhile also from the upper regions pre-historic settlement structures have been recorded. In 2005, in order to start to fulfil the recommendations of the Tripoli workshop of 2004, the Heinrich-Barth-Institute has carried out an archaeological survey at the western foot zone of the mountain (Fig. 30). In spite of the fact, that near to the well known rock art sites most artefacts have already been looted since colonial times and that on the wadi floors and in the foreland they are covered by sedimentation processes, the survey revealed a comprehensive idea about the prehistoric settlement. There can be no doubt that with proper surveys going on especially in the so far untouched upper regions, Jebel Ouenat will reveal its full archaeological wealth (Kuper & Riemer in print).

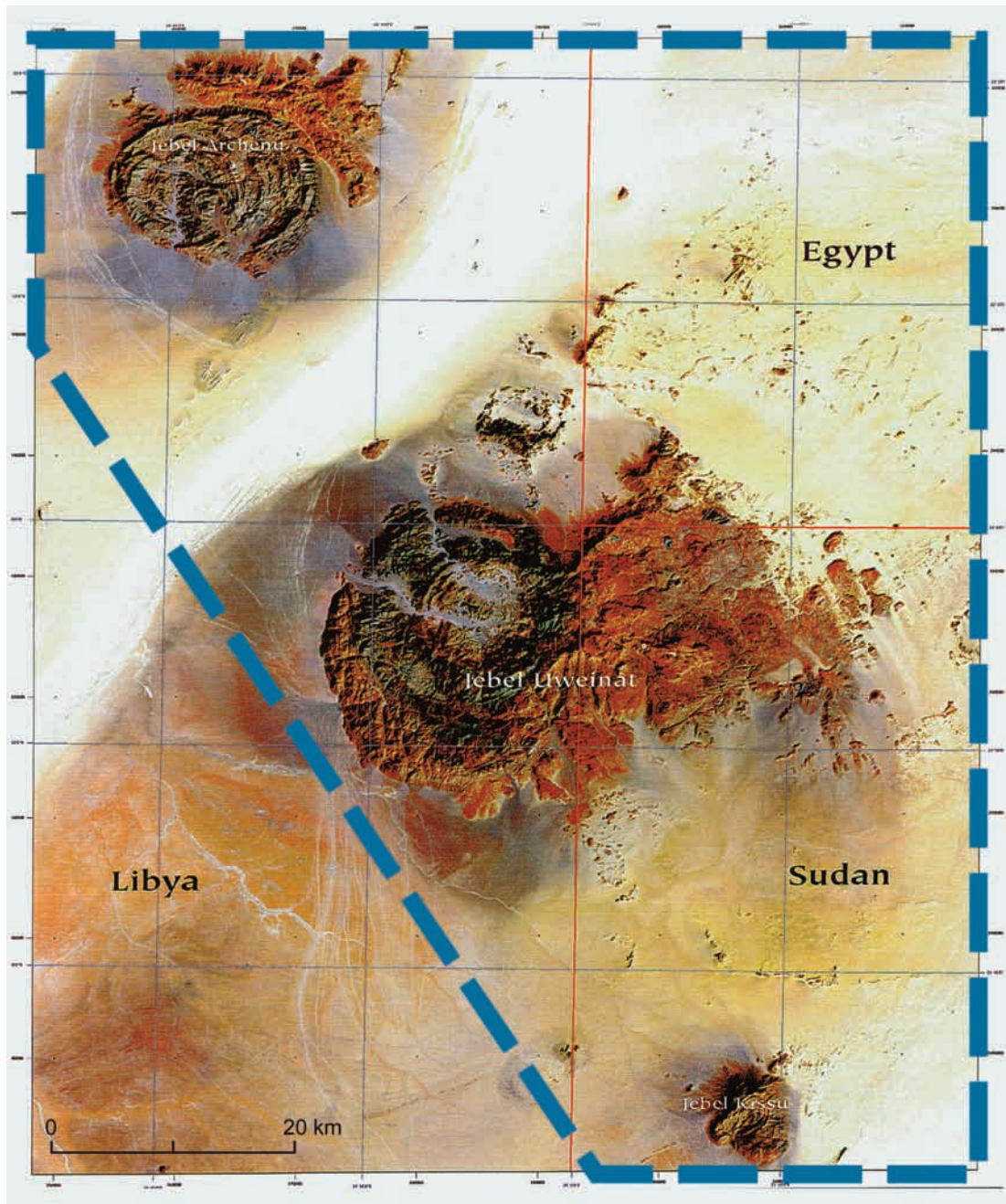


29) Karkur Ibrahim: Cattle and people

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30) Satellite map of western Jebel Ouenat showing the transects and sites surveyed by the HBI-Expedition 2005.

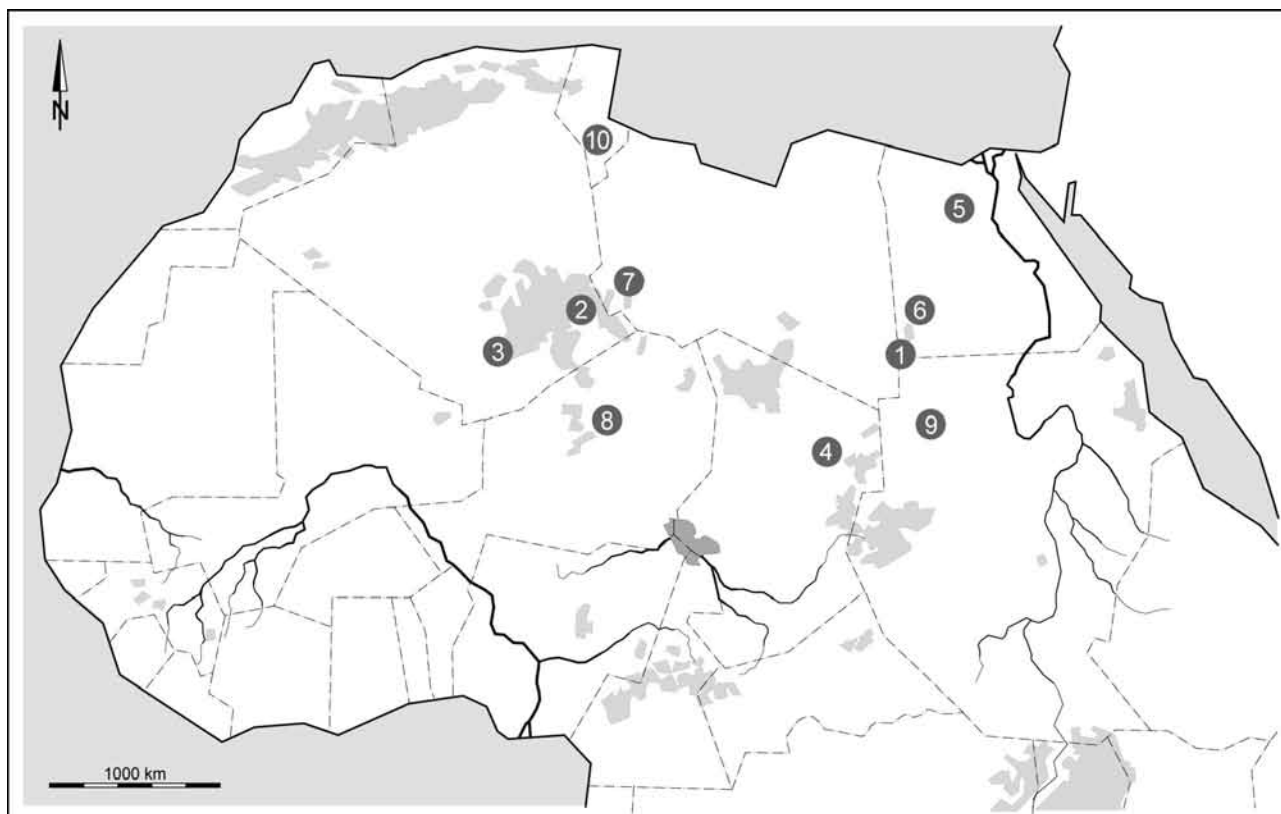


31) Proposed limits of the “Jebel Ouenat World Heritage Site”

1.6 Proposed “Transboundary Cultural Landscape”

The proposed perimeter of the protected area should take into account the common or partly supplementary geological history of the three mountains Arkenut, Ouenat and Kissu and also the role that the surrounding plains will have played for the presumably semi-nomadic people who created the rock art. Future research will also be interested in comparative studies of the landscape as a whole system, with regard to past human adaptation as well as to that of actual flora and fauna to the specific environmental situation in the three analogous but clearly separated geographic

features. Following this, the protected area should perhaps measure ca. 100 x 90 kilometres between N 21°30' and 22°25' and E 24°30' and 25°20'. Of the all together 9,000 square kilometres fall to the share of Libya 5,400 km², of Sudan 1,964 km² and of Egypt 1,636 km². With regard to the intensive traffic passing through the south-western corner perhaps this part could be renounced along a line from N 21°30' / E 25°00' to N 22°00' / E 24°30' (= 1,473 km²), thus reducing the Libyan share to 3,927 km² and the whole expanse to about 7.500 square kilometres.



32) Protected areas in the Sahara

2 Overview of the existing and planned desert parks in the Sahara

The following account of parks in the Sahara only comprises protected areas in the Sahara Desert proper. Parks situated in savannah regions, coastal areas or wetlands have not been taken into account since they are not comparative to Jebel Ouenat that is under discussion here.

2.1 Algeria

2.1.1 *Tassili n'Ajjer*

Fig.32 / 2

Year of Inscription: 1982

Area: 72 000 km²

WH-Criteria: (i), (iii), (vii), (viii)

This oldest protected area in the Sahara is located in the extreme Southeast of Algeria close to the Libyan border. As a World Heritage Site it combines several natural and cultural criteria. The landscape is characterised by extremely picturesque eroded sandstone formations including hundreds of natural rock arches and numerous caves that house an enormous wealth of rock art that is among the most spectacular world wide. While on open rock surfaces mainly engravings can be

found, in rock shelters colourful paintings are preserved providing an vivid insight into the history of the region. This concerns especially the interrelation between man and the changing environment during the past 10,000 years that is reflected in the different topics displayed. The oldest presentations not only depict large fauna like elephant and rhino, but also hippopotamus and crocodile and thus demonstrate favourable climatic conditions for man's life as hunter and gatherer. The following phase, dominated by paintings of cattle and their herders in a savannah like environment, gives witness of a fundamental economic change that followed the introduction of domesticated animals. These later on include horses as well as camels, the latter appearing in this part of Africa only 2000 years ago. It is noteworthy that the change in the topic of the art not only demonstrates the growing aridisation, but generally goes along with a change in its style, a phenomenon that was worked out first in the Tassili and found its approval in many other rock art provinces of the desert. The former more favourable environmental conditions are also demonstrated by some rare tree specimen like Cypress, Olive and Sycamore Fig that survive here as a witness of the profound climatic change.

The same holds true for some faunal examples like four different species of fish and a dwarf crocodile. The protection of this rare natural and cultural heritage is managed by the National Park Office at Djanet that employs more than 40 wardens and guides, who however are faced to growing numbers of tourists posing increasing problems, particularly of litter and vandalism.

2.1.2 *Ahaggar National Park*

Fig.32 / 3

Year of Inscription: 1987

Area: 3 800 km²

The Ahaggar (also Hoggar) National Park is situated in the southernmost part of Algeria. It comprises the highest mountain area in the Sahara with its peak, Jebel Tahat, 3003 metres a.s.l.. It is owing its main attraction for one part to its inhabitants, the Tuareg people, and for the other to its geological formations that are mostly of relatively young volcanic origin (only about 2 million years old), and thus presenting a sharply outlined, fascinating scenery. One of the most famous summits is mount Assekrem with the hermitage of P ere de Foucauld, a French eremite, who lived there at the beginning of the 20th century. There is only rare and sporadic rainfall but the climate is less extreme as in other parts of the Sahara what makes the area a host of relict species and a major location for biodiversity. The massif is the land of the Kel Ahaggar Tuareg whose origin is related to the tomb of their "Queen" Tin Hinan at Abalessa oasis near the main town in the region, Tamanrasset. The history of the region is well illustrated by a wealth of rock art, paintings as well as engravings, that however do not reach the richness and diversity of the one in the Tassili n'Ajjer.

2.2 Chad

2.2.1 *Ennedi-Ounianga National Park*

Fig.32 / 4

Year if Inscription: proposed

Area: 18 380 km²

The area proposed by the Chadian government as a National Park and a World Heritage site is situated in the eastern part of the country in the province Borkou-Ennedi-Tibesti. It comprises two different regions divided by 200 kilometres: the region of Archei in the Ennedi mountains and the Ounianga lakes at the southern fringes of the Sahara.

Rising up to 1450m the sandstone massif of Ennedi provides relatively favourable living conditions in the surrounding southern Sahara desert. This position of an island can serve as a model for the environmental situation perhaps 5000 years ago at Jebel Ouenat, situated about 600 km further North. In the southwestern part of the plateau broad wadis provide an at-

tractive contrast to the high rising sandstone formations shaped by erosion into bizarre giant sculptures including a number of picturesque rock gates. While in the savannah plains and on the top of the plateau extended dense Acacia forests can be found, narrow gorges like the guelta of Bechikele host an extrazonal tropical vegetation including Dum palm and Fig trees as a relict flora that normally needs 600 mm of rain. Most famous is the guelta of Archei, not only for its impressive view when hundreds of camels are watered there filling the gorge with their roaring sound, but also for the presence of different species of fish and the seven last surviving Saharan crocodiles. Former more favourable climatic conditions are best illustrated by the extremely rich trove of rock paintings in the numerous shelters provided by the sandstone formations. The most ancient phase is dominated by cattle whose bodies often are filled with puzzling geometrical designs. The introduction of the horse during the last century BC is documented by numerous vivid hunting scenes showing the horses in "flying gallop" and the riders with their lances and shields apparently as warriors. Similar in style and dynamic are the presentations of the following camel period that include scenes of hunting giraffes by camel and demonstrate evidently the progress of environmental change. Large necropoles of hundreds of stone tumuli obviously belong to this period while stone age findings including early pottery of wavy line type prove the early and middle Holocene occupation of the area. The present population is still using the prehistoric shelters and occasionally causing damage to the ancient paintings while children try to sell stone artefacts to visitors. As a consequence of the Darfur conflict the anyhow relatively limited tourism has rapidly decreased. There exist no measures of protection and no kind of tourism management.

The chain of lakes of Ounianga Kebir and Ounianga Serir is maintained against the hyperarid environment by groundwater inflow from the Nubian Sandstone Aquifer, which was last recharged during the early Holocene. With its unique hydrological system Ounianga Serir ranks among the most picturesque and geologically interesting landscapes of the Sahara. In spite of the high evaporation rate all of the lakes except one contain fresh water. This is due to the fact that they are largely covered by a metre-thick floating reed mat that limits evaporation, while the open surface of the central lake Teli functions as an evaporation pump that keeps the water flowing and prevents the salinisation of the adjacent freshwater lakes. They house several species of fish and gastropods that presumably descend from their 9,000 years old ancestors in the deposits exposed 80 m above the actual lake level. Lake Yoa at Ounianga Kebir bears in its sediments a climatic archive that is unique in Africa (KR PELIN et al. 2008). Coring from the 27 m deep bottom of the lake produced a sequence of more than seven me-

tres of finely laminated sediments with annual lamination (varves) including pollen and diatoms. This allows reconstructing the evolution of the aquatic and the terrestrial ecosystem over the past 6,000 years. It proofs the final desiccation of the Sahara around 2,300 B.C. and offers to different disciplines an unique array of information for environmental studies. Unfortunately the ecosystem of the lake is threatened, especially by military garbage from past and present conflicts. No administrative protection is in sight.

2.3 Egypt

2.3.1 *Wadi Al-Hitan*

Fig.32 / 5

Year of Inscription: 2005

Area: 200 km²

WH-Criterion (viii)

Situated in the Fayum district at the fringes of the Western Desert west of Cairo and as a part of the recreation area of Wadi Rayan Protected Area, Wadi Al-Hitan, the “Valley of the Wales” is one of the most fascinating open air attraction in palaeontology world wide. Since about 40 millions of years thick layers of sandstone, limestone and shale have been deposited, that now, partly wind-eroded to picturesque pillars, create a landscape of indisputable scenic beauty. This is the only place in the world, where the skeletons of families of fossil whales are exposed in their original geological and geographic setting. For several millions of years a shallow nutrient-rich bay provided the living conditions for the evolution of these ancestors of modern whales. Their way from land to sea is demonstrated by two species that still had small hind limbs, feet and toes. Over 400 skeletons of whales and other vertebrates are displayed on the desert floor released by erosion. Many more are expected to be excavated. Their imbedding into different geological layers provides valuable indicators of palaeogeographic and palaeoecologic conditions and the evolution of marine mammals. The site is managed by the Nature Conservation Sector of the Egyptian Environmental Affairs Agency and has well established information and tourist accommodation facilities. Its specialisation however does not allow to regard it as a desert park in the proper sense.

2.3.2 *Gilf Kebir National Park*

Fig.32 / 6

Year of Inscription: 2007

Area: 47 940 km²

The Gilf Kebir area is an extended sandstone plateau in the far Southwest of Egypt stretching over ca. 80 kilometres between the Great Sand Sea and the Sudanese border. Its eastern side shows impressive steep cliffs that rise for 200 – 300 metres

above the desert floor. It is dissected by a number of deeply cut in, picturesque wadis as a result of long lasting erosional processes. In some of these as Wadi Abd el Melik and Wadi Hamra still a few *Acacia* trees survive, but by far not as many as e.g. in Karkur Talh in Ouenat. Anyhow the vegetation still is sufficient to support a modest occupation of barbary sheep. The most important valley with regard to the history of climate is Wadi Bakht. Here the early and middle Holocene rains streaming down from the plateau have been blocked by a high dune that crossed the wadi and formed a lake that attracted human occupation for millennia (KRÖPELIN 1987; 2005. LINSTÄDTER & KRÖPELIN 2004). The sediments of this lake, exposed now in a section of more than eight metres, reflect the changing climatic conditions between 8.500 and 3.500 B.C. and are an unique document for the interrelation between environmental and cultural development.

The plateau is divided into an eastern part (named Kemal el Din Plateau) and a western part (called Abu Ras Plateau) by a broad gap through which the sand from the Great Sand Sea finds its way southward down to the Jebel Ouenat region where it has built up the Arkenu Dune in Libya. In the North the magnificent dunes of the southwestern part of the Great Sand Sea are included into the park area. There the so called “Libyan Silica Desert Glass”, that only occurs here and in a very limited distribution, forms a great attraction for tourism, that at the same time bears a great threat for this rare mineral. (BARAKAT et al. 1997; DE MICHELE ed. 1997). The southernmost corner of the park comprises the Egyptian share of Jebel Ouenat with a few, but beautiful painted rock art sites, partly discovered already in the 1930ies (WINKLER 1939). Paintings from the cattle period can also be found at Wadi Firaq in the southern part of the Kemal el-Din Plateau at “Shaw’s Cave” (SHAW 1936) and in the “Cave of Swimmers” at Wadi Sura at the southwestern corner of the Abu Ras Plateau (ALMASY 1936; 1997). Close to this place, that became world famous by the role of its discoverer Lazlo Almasy in the Oscar awarded movie “The English Patient”, recently additional painted caves have been discovered (ZBORAY 2005), among these especially one large shelter that by the kind and number of its paintings – hundreds of handprints, dancing people, mysterious animals, but no cattle – by far surpass all comparable sites in the Sahara (LE QUELLEC et al. 2005). They open a spectacular window into the social and spiritual life of past populations whose occupation has been studied by intensive archaeological fieldwork especially in Wadi el Akhdar (SCHÖN 1996) and Wadi Bakht (LINSTÄDTER ed. 2005). The gained outline of holocene human occupation in the Eastern Sahara – leading from hunter-gatherers to cattle herders and finally to camel leaders – also forms an important background for understanding the cultural and economical development in Jebel Ouenat. There, however, the much richer wealth of rock art together with the

available archaeological evidence provides varied chances for future research and a comprehensive insight into the interrelation between environmental and cultural development.

Since the Gilf Kebir is to a large extent an unexplored area its management is faced to many practical problems, especially because protection and control for such a remote area at a distance of more than 500 km to the next settlement are difficult to implement. The travel permits for the tour companies have – besides the military authorities – to pass the Ministries of Environment (EEAA) and Tourism as well as the Antiquities Service (SCA), what, however, has no real effect on the protection. So with great hopes a concept of “Mental Fences” was initiated with training courses for desert drivers and guides (KUPER 2007) that, however, faltered in its beginnings and is awaiting new implementation. The Jebel Ouenat educational program perhaps could provide here stimulating support.

2.4 Libya

2.4.1 *Rock-Art Sites of Tadrart Acacus*

Fig.32 / 7

Year of Inscription: 1985

Area: 250 km²

WH-Criterion: (iii)

The long lasting, intensive Italian research activities into the prehistoric paintings and engravings of Tadrart Acacus, initiated by Fabrizio Mori, made this mountain chain in southwestern Libya famous among the Sahara centres of rock art. While the western front of the mountain chain shows an inaccessible impressive steep escarpment, in the East it is dissected by many deep incised wadis exposing picturesque sandstone formations that form an attractive contrast to the adjacent dunes of the Murzuk Sandsea. Along the wadis numerous rock shelters have preserved colorful rock paintings in different styles that represent the subsequent phases of human occupation in the area. They correspond to a large extent to the paintings in the neighbouring Tassili n'Ajjer, featuring a sequence from the “naturalistic” phase, the “round-head” phase and the “pastoral” phase followed by the “horse” and the “camel” phase. Better than the Tassili paintings they can be related to a larger number of archaeological excavations who allow establishing a comprehensive sequence of the cultural and economical development in the region.

The park is target of increasing tourism that in spite of guardians, organized routes, camping areas etc. causes many threats for environment and archaeology. This also concerns the adjacent plateau of Messak Settafed with its rich trove of rock art, that in addition is endangered by the expansion of oil prospecting activities. So a group of Italian scholars has started an initiative to

include the whole region into an “Archaeological Park” that can provide the necessary means of protection but demands for extended administrative structures and thus great financial support (LIVERANI et al. 2000).

2.5 Niger

2.5.1 *Air and Ténéré Natural Reserves*

Fig.32 / 8a

Year of Inscription: 1991

Area: 77 360 km²

WH-Criteria: (vii), (ix), (x)

The reserve, which is one of the world's largest protected areas, comprises the eastern part of the volcanic massif of the Air mountains rising up to 1,988 m, and the sand dunes and plains of the Ténéré desert east of it. It forms a Sahelian island with isolated climate, fauna and flora in the surrounding southern Sahara and contains an outstanding variety of landscapes with rare plant species, wildlife and cultural testimonies. The geological features within the reserve are dominated by a chain of nine granite intrusions and other volcanic features like the extinct caldera of Arakao and one of the world's largest ring-dike systems. The sand dunes of the Ténéré comprise some of the highest dunes of the entire Sahara rising up to 300 m. Above 1,000 m in more humid localities of the mountain zone, depending on seasonal rains in July and August, relict Sudanese and Mediterranean plant species can be found, including *Acacia nilotica* and wild Olive and a large number of herbs. All together there have been recorded over 350 plant species that, however, are endangered by overuse and tree-cutting, that is hoped to be limited by the park management. The same concerns the faunal population that comprises 40 species of mammal, including dorcas and dama gazelle, Barbary sheep and Addax. While since the creation of the Reserve the number of dorcas gazelle increased to more than 12,000, the other species are still low in number and threatened by poaching. Air and Ténéré are holding an extremely rich cultural heritage including rock art from all Holocene periods and abundant archaeological remains from late palaeolithic campsites up to the present Tuareg settlement. Prehistoric occupation sites that mainly are bound to extinct river courses and lake beds, offer a vivid insight into the cultural and economical development of past societies and their struggle against the threats of changing climatic and environmental conditions. Archaeological investigations that e.g. revealed the oldest pottery in the Old World dated about 10.000 years old, proved the unique scientific potential of the region. This, however, is looted to a large extent by artefact collecting tourists, who thoughtless destroy archaeological context. Certainly the well established park authorities, who in

2001 had about 40 employees, try to stop this souvenir pil-laging in the same way as the poaching of wildlife, but due to the still ongoing Tuareg rebellion their possibilities are actually very limited.

2.5.2 *Air and Ténéré Addax Sanctuary*

Fig.32 / 8b

Year of Inscription: 1988

Area: 12 800 km²

The Addax Sanctuary was established 1988 within the then *Air and Ténéré National Nature Reserve* (since 1991 on the World Heritage List as *Air and Ténéré Natural Reserves*) mainly in order to protect the critically endangered *Addax nasomaculatus*. This species that is well adapted to large desert plains and can survive almost completely without free water, formerly roamed large parts of northern Africa. The intended conservation of desert wildlife, including other species as e.g. ostrich, well could work as a pilot project for other desert parks. Any such activity however, as the reimplementation of Addax from outside, is actually stopped by the ongoing insurgency of the Tuareg people in the area.

2.6 Sudan

2.6.1 *Wadi Howar National Park*

Fig.32 / 9

Year of Inscription: 2000

Area: 100 000 km²

The Wadi Howar is a West-East running shallow depression that marks the southern limits of the Eastern Sahara and the beginning of Sahelian vegetation. This is still today supporting the life of a few nomads of the Kababish tribe who after the seasonal rains use the sparse "Gizzu" grass as pasture for their camels. While in all existing maps of northern Africa the outlines of the wadi are ending about 400 km west of the Nile, recent research proved its course until the river as its northernmost tributary still in the 2nd millennium B.C. (KRÖPELIN 1993), hosting up to 14 different species of fish. Thus it played an important role as a line of communication between inner Africa and the Nile valley and as an area of intensive human occupation. This is reflected by numerous extended settlement zones along its banks covered by millions of potsherds and animal bones. These provide clear evidence for the economical change of human life during the past 10,000 years from hunter and fisher to cattle keeper and finally camel nomad and mirror the close interrelation between climatic change and cultural development.

Extending from South to North for about 550 km the park includes the Sahelian zone as well as the hyperarid Saharan desert and represents the largest protected area in Africa. In its South the volcanic Meidob Hills with the picturesque Malha

crater lake mark a scenic highlight, as does further north the granite landscape of Jebel Rahib in the Middle Wadi Howar and close to it the sandstone pillars of Zolat el Hamad, where vivid rock engravings of cattle, elephants, rhinos and other wildlife illustrate the former favourable living conditions. The northern extension of the protected area comprises the uninhabited oases of El Atrun with its still ongoing traditional salt mining, the shrinking lake of Nukheila and finally the famous water hole of Laqiya Arbain, the most important relay station at the historical camel route of the Darb el Arbain, the still visible tracks of which are also an important historical feature to be protected. As extrazonal areas in Upper Wadi Howar an extended forest with many relict plant species has been attached to the park and in its lower part 100 km west of Nile a Napatean fortress, obviously once a fortified control station at an important traffic route to inner Africa.

In addition to the rich testimonies of its past, Wadi Howar still in the 1930ies was the home of rich wildlife including addax and oryx antelope, ostrich and lion. In our days the still surviving population of gazelles is under threat to be extinct by frequent hunting parties from the Gulf States. There are no means to stop or control this. After the declaration of the park unfortunately no management plan was worked out and no financial support was available to establish any administration. In the meantime the insecure situation caused by the Darfur conflict makes the mayor part of the park inaccessible.

2.7 Tunisia

2.7.1 *The National park of Jebil*

Fig.32 / 10

Year of Inscription: 1994

Area: 1 500 km²

Among the numerous protected areas in Tunisia this one is the largest and the only one representing the Sahara desert proper. Located 80 km south of Douz it includes the mountainous solid mass of Jebil and to its larger extent the Tunisian share of the impressive dunes of the Grand Erg Oriental. The vegetation consists of sparse desert shrubs that support some typical desert animals like dune gazelle, fennek, hare and horn viper. The cultural heritage is limited to prehistoric occupation sites marked by stone artefacts and ostrich eggshell that demonstrate the former more favourable living conditions. Besides its general target to protect the biodiversity of a Saharan ecosystem the park serves as an attraction to tourist who like to experience one night in the real desert. The park shelters a station of guarding which is carried out by guards with horses and camels. Reception facilities and an ecomuseum are in preparation

3) Comparative evaluation of the criteria for the WH inscription of Jebel Ouenat

3.1 Selection of criteria

To identify and assess the cultural and natural heritage values of Jebel Ouenat the criteria for Outstanding Universal Value set in the *Operational Guidelines for the Implementation of the World Heritage Convention* (UNESCO 2008) are used as a conceptual and scientific framework. After visiting the site and based on the knowledge of its heritage, the participants of the 2004 workshop agreed that the following criteria could, pending confirmation from further studies and research, be retained for a possible future Nomination for inscription on the World Heritage List, or at least for preparing and submitting to the World Heritage Centre a Tentative List application from the three countries. The selected criteria are described below, the specific requirements of the *Operational Guidelines* being underlined.

3.2 Criterion (iii)

The Jebel Ouenat bears an exceptional testimony to a civilisation which has disappeared, with particular reference to the very numerous rock art sites representing African cattle pastoralism, displayed through a particularly rich concentration and variety of styles. Following the actual state of prehistoric research, cattle pastoralism, still today the most important subsistence strategy in the arid parts of Africa (making up 40 % of the continent's surface), has developed from the area that is now the Eastern Sahara. The different stages of this development – from cattle domestication to complex structured pastoral societies and their withdrawal from the area – are yet only poorly understood. These cattle herders will preferably have exploited the great plains as they are surrounding the Ouenat massif on whose permanent water resources they became increasingly dependent when rains decreased. While outside the mountain their traces are hardly detectable, the means offered to their artistic expressions by the inviting rock surfaces, today shelter an unique treasure of information about their life. Among the rich ethnographical details provided by the pictures for instance the artificial deformation of cattle horns is to mention, that has already been described by Herodotus as practised by the Garamantes in Libya and is shown by Nubian cattle in ancient Egyptian wall paintings as well as still in use among Nuer tribes in Southern Sudan. Like this example other elements in the rock art of Ouenat convincingly illustrate the great antiquity of substantial elements of African cattle pastoralism.

3.3 Criterion (iv)

The Jebel Ouenat is an outstanding example of a type of landscape, which illustrates significant stages in human history. Owing to its exceptional geographical position as an ecological favoured niche in one of the most arid parts of the world, the Jebel Ouenat attracted human occupation of the Eastern Sahara

through the whole Holocene up to the present. Contrary to other parts of the Eastern Sahara, where settlement was limited to perhaps 5000 years, the Jebel Ouenat might mirror the whole sequence of human adaptation to arid environments and the different stages of hunting to cattle keeping and finally caravan traffic. This includes the earliest evidence of trans Saharan trade routes by pharaonic long distance donkey caravans as well as the role of the mountain during WW II and the recent history of the area.

3.4 Criterion (v)

The Jebel Ouenat is an outstanding example of a traditional human land use, which is representative of cultures especially when it has become vulnerable under the impact of irreversible change. Jebel Ouenat, as the only point of water in a radius of several hundreds of kilometres, has been for millennia a heaven for hunters as well as for pastoralists, a station along desert routes and a meeting point of different cultures. The characteristics and resources that enabled this use of the landscape are still present today: A prominent landmark in the desert providing shelter for travellers, permanent water, fauna for hunting, pasture for herding, camel food and fire wood for the caravans. Indeed travellers and traders are still making camp at Jebel Ouenat, today like thousands of years ago, hunters are still killing gazelles and barbary sheep like the ancient authors of the rock drawings (also following them in leaving their messages on the rocks) and people, including tourists, are still coming from afar attracted by the favourable conditions. The exceptional continuity, over the millennia, of such traditional use, is threatened today by an incompatible and excessive exploitation, especially as a consequence of military presence and long distance motor traffic with its overloaded lorries and finally tourism. Its conservation will depend on the safeguarding and careful management of the fragile resources of Jebel Ouenat (water, fauna, environment in general).

3.5 Criterion (vii)

The Jebel Ouenat contains superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance. These phenomena include being a prominent feature (nearly 2000 m of altitude above the sea level) emerging abruptly like an island from a very large flat extension (hence the scientific name of "inselberg"), featuring picturesque arranged mountain chains, with very peculiarly shaped huge granite boulders, as well as steep high cliffs with bizarre dilapidated sandstone formations. In front of this cyclopean scenery the scarce but expressively contrasting vegetation generates pictures of rare fascination. In addition Jebel Ouenat provides the unique possibility of entering a plutonic rim formation cutting its successive rings through a wadi and observing this characteristic geological formation from

its centre, as in the middle of a giant natural amphitheatre. The extraordinary landscape created by the superimposed granite boulders, moreover, provided a perfect shelter to the ancient inhabitants of the Jebel Ouenat and an ideal surface for their artistic expression.

3.6 Criterion (viii)

The Jebel Ouenat is an outstanding example of the development of landforms and significant geomorphic features. Besides being a unique water point in a huge desert area and the highest elevation in eastern Sahara at the centre of a large flat area (i.e. an exceptional landform), the weathering process of the plutonic rocks (granites) created gigantic rock boulders, which are a very rare geomorphic feature. The western part of the mountain, entirely lying on Libyan territory, includes the largest and best exposed of the so-called ring complexes, representing the eroded remnants of a large granite dome with a diameter of 24 km formed about 50 million years ago. Due to the absence of vegetation all geological features are open accessible essentially consisting of rocks ranging in composition from granites to syenites. Weathering of these plutonic rocks resulted in the formation of colossal boulder-like forms, tens of meters in diameter, that create the spectacular scenery of the western side of the Jebel. In addition, particular erosion phenomena enable the access to the core of the rim complex, thus exposing the last remains of ancient land surface in this region. Finally, the three Jebels (Arkenu, Ouenat and Kissu) have been formed by successive hot-spots “bubbles” which, because of their relative distance, provide an insight on the phenomenon of the slow but continuous shifting of the continental plate over hundreds of millions of years.

3.7 Criterion (ix)

The Jebel Ouenat is an outstanding example representing significant ongoing ecological and biological processes in the evolution and development of terrestrial ecosystems and communities of plants and animals. Due to the isolation of the massif in the eastern African context, the biocoenoses of Jebel Ouenat might exhibit, pending confirmation from further research, special ecological adaptation on an infra-specific as well as ecosystem level.

3.8 Criterion (x)

The Jebel Ouenat contains a significant habitat for the in-situ conservation of biological diversity, including threatened species of outstanding value. The presence of the Barbary sheep is attested in the area of the Jebel Ouenat. This is a threatened species endemic to the Sahara but almost extinct elsewhere. The Jebel Ouenat provides a unique possibility for the conservation of this particular species, as well as of others that might still exist or could be reintroduced. Moreover, compared to other Saharan massifs the Jebel Ouenat displays a particular high density of plant species per area.

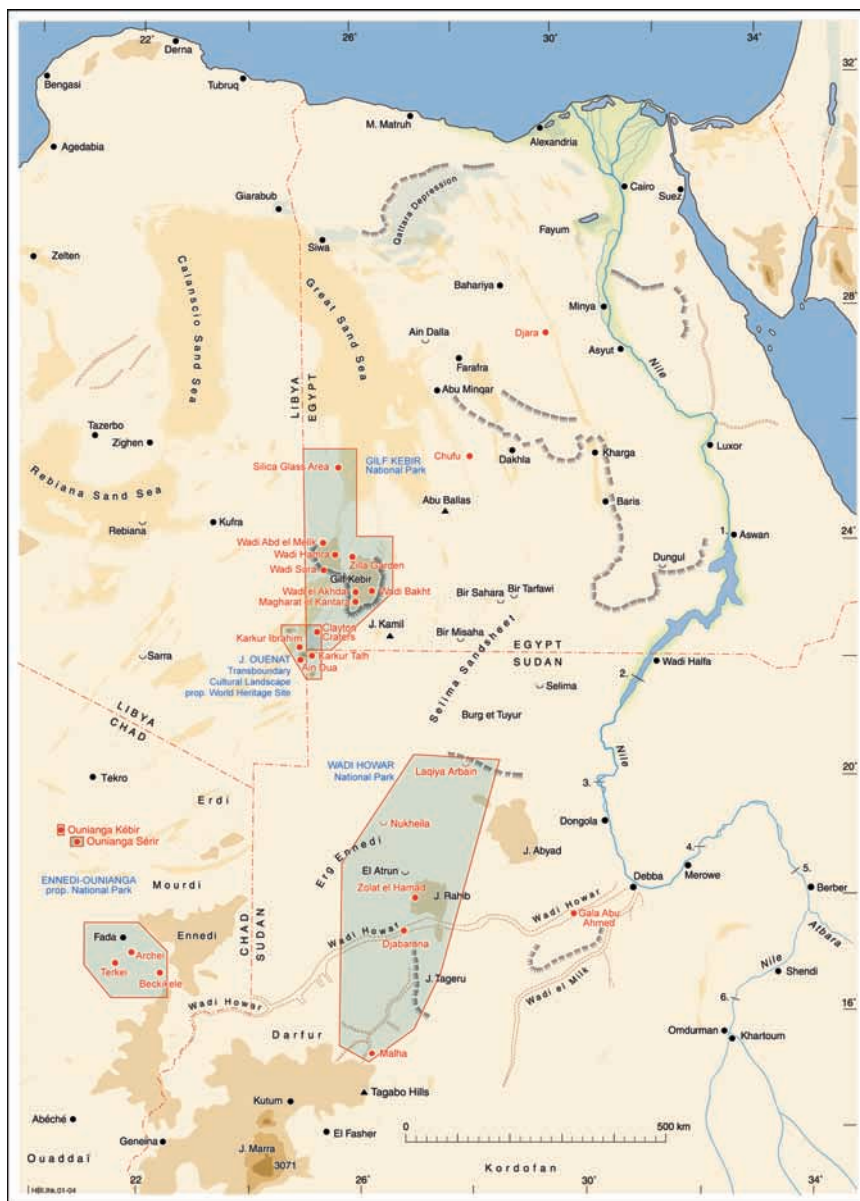
3.9 Comparative summary of criteria

Comparing the series of criteria applicable to Jebel Ouenat with other protected areas it becomes evident, that Jebel Ouenat owes its unique pile of natural and cultural values to the fact that it combines different phenomena and features by its character as an “inselberg” within the surrounding desert. This specific situation is only met by the neighbouring Jebel Arkenu and perhaps by the Brandberg in Namibia and makes Jebel Ouenat a world wide outstanding testimony of the interrelation between nature and culture.

Alone the geological structure of the mountain as a hot spot forming a ring complex, where all geological features are open accessible and provide an insight into earth history and *an outstanding example of the development of landforms and significant geomorphic features (criterion viii)* is in its specific character unparalleled among the other saharan parks. While these like the Tassili n'Ajjer and Ahaggar National Park and the Gilf Kebir National Park also are distinguished by their beautiful and impressive landscapes, the spectacular cyclopean scenery of Jebel Ouenat especially is created by the gigantic superimposed granite boulders that represent as well all together as in detail a *superlative natural phenomenon of exceptional natural beauty and aesthetic importance (criterion vii)*.

This unique landscape provides rare habitats to flora and fauna and their special ecological adaptation to an hyperarid environment. Due to the isolation of the mountain this situation offers the chance to study *significant ongoing ecological and biological processes in the evolution and development of terrestrial ecosystems (criterion ix)*. With its high density of plant species the mountain *contains a significant habitat for the in-situ conservation of biological diversity, including threatened species (criterion x)*. It are not the rare animal species – most of them also present in other desert parks – that make the situation in Jebel Ouenat so exceptional, but their role under the strongly limiting environmental conditions of the “inselberg”-situation.

This situation also provides the essential background to understand Jebel Ouenat as *an outstanding example of a traditional human land use, which is representative of cultures especially when it has become vulnerable under the impact of irreversible change (criterion v)*. This is especially demonstrated by the development of african cattle pastoralism that had its origin in the eastern Sahara. With the increase of aridity the herds had to withdraw from the former generally available savannah pasture to ecological niches among which Jebel Ouenat was an exceptional one. Its few permanent wells have been the base for a transhumant way of life between the mountain and the surrounding plains when these after seasonal rains had been turned into grazing grounds. This kind of adaptation to the challenges of the envi-



33) Desert parks in the Eastern Sahara

environment can be followed up until modern times throughout the holocene history of the area that gives *an outstanding example of a type of landscape, which illustrates significant stages in human history (criterion iv)*. These stages leading from hunter-gatherer to cattle herder and camel keeper are vividly illustrated by an extremely rich wealth of rock paintings and engravings that together with other archaeological remains undoubtedly represent *an exceptional testimony to a civilisation which has disappeared (criterion iii)*. In the whole of the Sahara their significance and artistic standard are only matched by the paintings of the Tassili n'Ajjer. Their singularity, however, is based besides their stylistic character on the environmental setting that makes Jebel Ouenat so outstanding among all other protected areas in the Sahara. From the five parks with World Heritage status the pro-

posed Cultural Landscape of Jebel Ouenat clearly is distinguished by the variety of the all together seven applicable criteria and their combination within the “inselberg”-environment. In addition the concept of this transboundary park offers the unique chance to three Arab states for a co-operation in the fields of culture and environment with an array of advantages on the political level as well as for the people in the concerned region.

The variety and uniqueness of the cultural and natural values of Jebel Ouenat and their growing threat urgently demand for effective protection. With regard to the fact that this world wide unique landscape, so closely jointed by nature, is divided between three states, the concerned problems can only be mastered by close co-operation across the borders.

The preparations for the inclusion into the World Heritage List as well as immediate effective protection ask for two kinds of action: (a) **field studies** as a base for a comprehensive description of the area and (b) an educational **training programme** for the concerned people (tour operators, drivers, tourists, military etc.). For both financial support has to be raised. The most con-

stitutive step, however, is the declaration of the single country sectors of Libya, Sudan and Egypt as national protected areas within the three nations. In January 2007 the Egyptian prime minister has declared the Gilf Kebir area including the Egyptian sector of Jebel Ouenat a National Park of Egypt. Thus Egypt has fulfilled the first recommendation of the Tripoli conference of 2004. Now it is the turn of the other two countries concerned, and Libya, that holds the largest share of the mountain, is requested to declare its part of Jebel Ouenat a **National Park of Libya**. On the other side **Sudan** is asked to take the chance to include its share of the mountain as an extrazonal area into the **Wadi Howar National Park**. With this precondition fulfilled finally as the next step all three countries have to include their shares of Jebel Ouenat into the “Tentative List” of their countries.



34) Rock painting at Ain Dua with recent damages and its copy from 1933

4 Conditions and necessary precautions for including Jebel Ouenat into the World Heritage List

4.1 Fieldwork

In order to implement the recommendations of the 2004 UNESCO workshop and to provide appropriate information about the natural and cultural values of Jebel Ouenat that meets the criteria for its inscription into the World Heritage List, a comprehensive description of the planned protected area is needed. This only can be obtained from a detailed site catalogue based on intensive interdisciplinary survey of the different zones of the mountain. Participating disciplines should be Geology/Geography, Biology/Botany and Archaeology/Prehistory.

The surveys should not only include the foot zone of the mountain, but also its upper regions that fortunately up to now only have been visited by a small number of desert enthusiasts (MEINARDI-NOGUERA & SOFFIANTINI 2008). So they are expected to be in a more pristine state of preservation than the lower areas, where archaeology has already been exploited by British and Italian soldiers during colonial times. However, as shown recently by the surprising discovery of pharaonic inscriptions in the Sudanese sector of the mountain (CLAYTON et al. 2008), also its lower portion is still yielding a wealth of unexplored evidence. This also was proved by an archaeological survey carried out in 2005 by the Heinrich Barth Institute in the Libyan sector that, however, has to be completed by an environmental study of the same area. (Fig. 30. KUPER & RIEMER in print).

4.1.1. Libya

While in the western foot zones only complementary survey is needed, the upper regions call for extensive exploration. Due to the difficult access and the lack of water, work in this area demands for specific logistic precautions. Besides transport facil-

ities these include high resolution satellite images ("Quickbird") that are necessary to plot all kind of observations, to analyse drainage systems and former habitation areas and to work out routes of access to the upper regions of the mountain. Since the governor of the Kufra district previously has declared his support for all scientific missions into the mountain, it might be possible to supply water and food by aircraft. Under this condition and having an efficient, motivated interdisciplinary team, the fieldwork in the Libyan part might require 2 campaigns of 4 weeks each. In addition a survey in Jebel Arkenu, that is included also into the park area, will need another 4 weeks, so that documenting the Libyan part will call for all together 3 months. This will be split off into several campaigns, while the intermediate time can be devoted to analysing the results and preparing the publication of the respective catalogues.

4.1.2 Sudan

In spite of the fact that the Sudanese part of Jebel Ouenat with Karkur Talh holds one of the richest concentrations of rock art, so far only limited archaeological survey has been carried out there. This also holds true for geological and environmental studies. According to some tourist information also the higher regions do promise a large number of rock art sites. So for this part, with the inclusion of Jebel Kissu, also an input of 3 months of fieldwork has to be taken into account. This only applies under the condition that the supplies from the Libyan side also can be used here and that the assent of the Sudanese Antiquities Service can be set into practice, that fieldwork in this part can be carried out from the HBI base in Dakhla instead from Khartoum.



35) Campfire with remains of a barbary sheep, to date surviving in Jebel Ouenat.

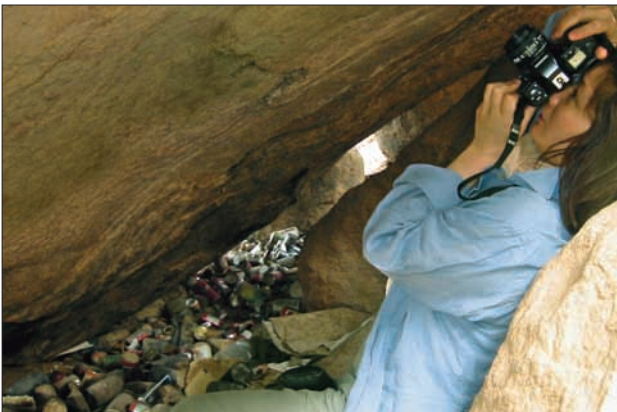


36) Acacia tree damaged for fire wood.



37) Rock shelter at Ain Zueia vandalised by oil on prehistoric paintings.

38) Rock art shelter used as rubbish dump.



4.1.3 Egypt

Since the Egyptian part of Jebel Ouenat is significantly smaller than the parts of its neighbours and does not include the upper region, fieldwork here might to be accomplished within 4 weeks. The North Eastern fore-land of the mountain, however, that is also included into the protected area, will require another month of survey, so that all together 2 months of fieldwork will be necessary for the Egyptian sector.

4.1.4 Catalogue

The fieldwork has to be followed by a detailed evaluation and systematisation of the collected data by each of the disciplines concerned. The final result should be a comprehensive catalogue of the natural and cultural heritage of Jebel Ouenat that could serve as a basic structure on which the management plan and later the park authorities can rely.

4.2 Training

Among the threats to the cultural and natural heritage of Jebel Ouenat the impact of tourism is the most serious one. Like in other parts of the Sahara the habit of tourists to collect archaeological souvenirs leads to a destruction of contextual information within prehistoric sites and thus to a loss of historic evidence that can never be reclaimed. Moreover, the presence of military posts at the mountain causes serious damage by disrespectful treatment and ruin of rock art sites as well as of the sensitive environment by poaching the last surviving game and robbing the scarce vegetation. So it seems necessary to raise awareness among the local population and institutions as well as among tourists and their guides, that the desert is an accessible book of history and an open air museum where the natural and cultural heritage is in urgent need to be preserved for the enjoyment and scientific research of future generations. For this objective an **information programme** has to be established raising awareness for the natural and cultural values of the area and the need for its protection. It should comprise information brochures as well as training courses. On the Libyan side this concerns mainly tour operators and military personnel, while for the Egyptian part in general mainly organised tourist groups have to be taken into account. Their guides, drivers and military attendants are planned to receive a respective training within the Gifl Kebir National Park programme. A special problem has been generated recently by the establishment of a military outpost close to Ouenat on the Egyptian side of the border with Sudan. Already in the few months of its existence it has caused a lot of pollution in its surroundings. On the Sudanese side for the time being neither larger groups of tourists nor permanent military posts are to be expected. The training programme for Libya should include (a) tour operators and drivers who have Jebel Ouenat in their programme and (b) members of the military, police and custom units posted at the mountain. Because the training,

among other topics, especially should comprise environment and archaeology, the courses could be connected with the field campaigns of these disciplines.

4.3 Protective measures

Independently, but in support of the – possibly time consuming – procedure of the inscription of Jebel Ouenat as “Transboundary Cultural Landscape” into the World Heritage List, immediate measures should be taken with focus on both, tourism and military presence.

With regard to the fact that the archaeological surface sites of Jebel Ouenat have been looted since colonial times, human occupation remains in the foot region of the mountain are hardly to be found undisturbed. Anyhow, since there still characteristic specimen are detectable further collecting of artefacts has to be prevented. **Tourism should be limited to fixed routes and the main points of interest should be furnished with information panels. The upper region of the mountain however has to be closed for tourists** or other visitors without special

permission and accompanying archaeological experts. Here the interior context of the prehistoric occupation sites and their relation to the landscape is expected to be still undisturbed and can provide important information about the human and environmental history of the central Libyan Desert and North-Eastern Africa as a whole.

The vandalism affecting and destroying directly the world wide unique rock paintings has to be stopped immediately as well as the pollution of the sites by kitchen and military garbage. As a first step towards this goal **the military and custom personal on the spot has to be informed about the unique values of the area** where they live and their responsibility for the protection of the cultural and natural heritage of their country. This especially also concerns their behaviour against the environment and the necessity to refrain from poaching and cutting wood. In a medium term perspective and as a precondition of the declaration of Jebel Ouenat a World Heritage Site **the transfer of the border posts to some distance of the cultural sites seems unavoidable.**

5 Conclusion

A comparative evaluation of the natural and cultural values of Jebel Ouenat definitely calls for its inscription into the World Heritage List. Meeting the conditions of seven of the ten WH criteria, the cultural landscape of this “inselberg” with its unique environmental and cultural heritage, is clearly singled out from all comparable areas in the Sahara. The realization of this ambitious transboundary project, however, is mainly depending on the willingness of the three concerned countries to take the chance for a fair and open co-operation.

Beyond the implementation of the proposed protective and educational actions, the growing security problems in the region require a re-organisation of the military, police- and custom outposts. Since 2008, in addition to the long established smuggling traffic from Libya to Sudan and Chad and vice versa, several cases of kidnapping of tourists and other acts of piracy by groups from the south took place close to Jebel Ouenat and up to 200 km inside Egypt. Together with personal experience in spring 2009, they give evidence that the region actually is largely out of control of the competent authorities. It seems, however, a not too unrealistic perspective, that the efforts for the protection of the cultural and natural heritage also can contribute to an endorsement of the security situation and that the necessary infrastructure of the heritage area might serve as a framework to co-ordinate the protective measures between the three partner countries.

In practice, the establishing of **ranger-posts** for the park administration may go along with the accommodation of military units as bases for mixed, highly mobile border patrols of well equipped and motivated personnel. With regard to the logistic restrictions in this remote region all three countries should concentrate their administrative bodies (military, custom, police and park authorities) at only three locations at the borders, that can act also as checkpoints. This holds the advantage that each country has to organize the water supply only for one station (Egypt at the border to Sudan, Libya at the border to Egypt and Sudan at its border to Libya). The recent experiences of piracy, however, strongly demand for well co-ordinated security control, supported by satellite supervision, and a flexible, mobile organisation that only can be successful by close contact and direct co-operation and exchange of information between all three countries.

Under this respect the proposed interdisciplinary field project as well as the educational programme offers a chance to open step by step the doors for such a **transboundary co-operation**. The daily needs and practice of the fieldwork will demonstrate to what extent practical cooperation across the frontiers is possible. If there ever will be a realistic chance to implement the Jebel Ouenat Park as a transboundary property and a World Heritage Site, the proposed study and educational programme might pave the way for it and demonstrate once more that UNESCO targets for the protection of the cultural and natural heritage also can contribute to the solution of political issues.

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Contact: Dr. Rudolph Kuper kuper@uni-koeln.de
Heinrich-Barth-Institut e.V., Jennerstr.8, 50823 Köln, Germany
Tel. Egypt: Mob. 012 233 97 57; Dakhla: 092 770 40 16