ATROUN WADI – LIWA (BOL), CHAD

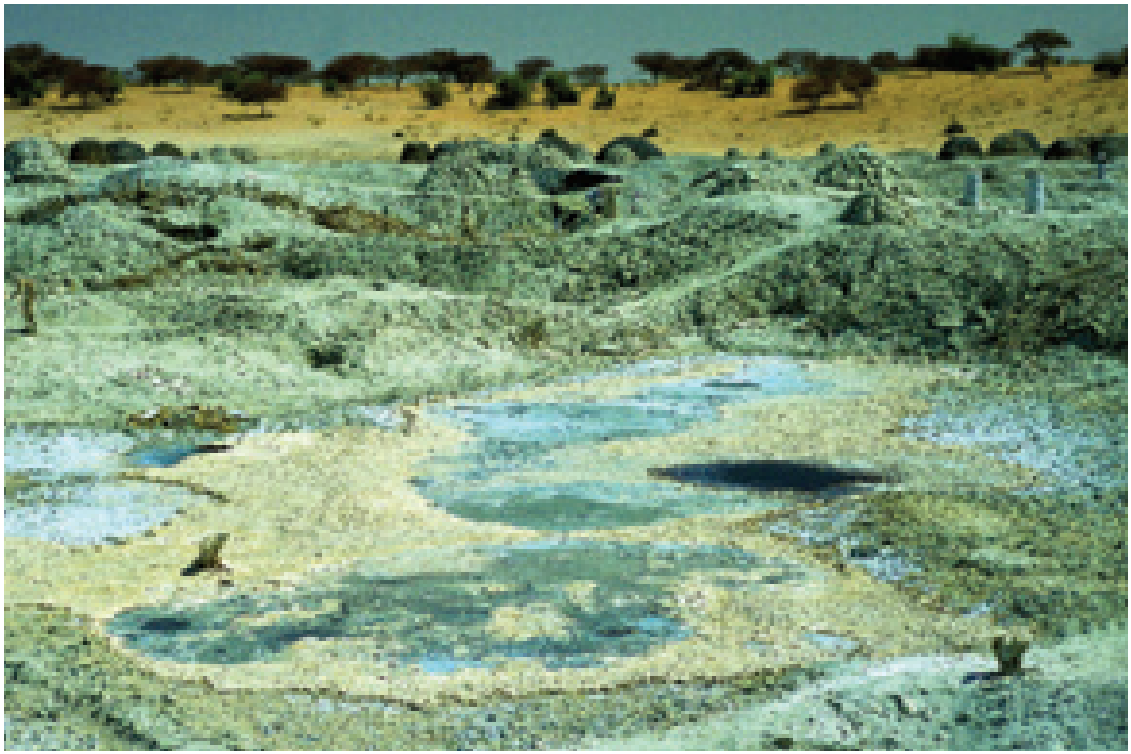
CHAD PRODUCES SOME 7 000 TONNES OF *ATROUN* PER YEAR – AN IMPORTANT SOURCE OF INCOME FOR THE COUNTRY

ATROUN

HISTORY

The origins of *atroun*, a valuable mineral found in the Lake Chad Basin, go back to the dawn of civilization. Its earliest use can be traced to the ancient Egyptians, who bought it from caravans coming from Cameroon and used it for embalming and mummifying their dead. The salt mines mentioned by the Arab travellers in the Middle Ages could have been *atroun* mines. Throughout history, this precious substance has been an important economic resource for local people, as well as a key ingredient of their own diet and that of their animals. Such is the importance of *atroun* that the nomadic pastoralists of the region traditionally planned their routes around supplies of the mineral, attaching almost as much importance to this as to the availability of forage for their livestock.

Today, *atroun* continues to play a significant role in the economy, diet and local practices of the people of the Lake Chad Basin. Given the potential of local and regional markets, it is a resource that could be further developed without damaging the environment. Chad produces some 7 000 tonnes per year, and this represents an important source of income for the country. Most of the *atroun* produced in the region comes from Chad and the Niger, and is exported to Nigeria and Ghana. It is transported either by truck or, as in ancient times, by camel and dug-out canoe [9.1].

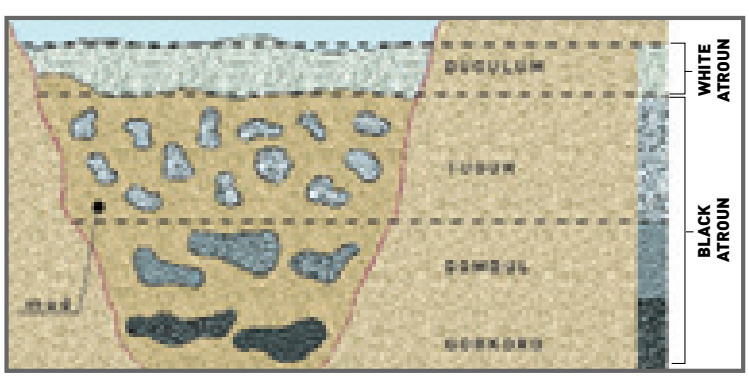


ATROUN WADI – LIWA (BOL), CHAD

ATROUN IS VISIBLE ON THE SURFACE, BUT THE BEST QUALITY SALT IS FOUND AT DEPTHS OF UP TO 3 M

EXTRACTION

The extraction of *atroun* is deeply rooted in tradition; this is the oldest economic activity of the northern region of the Lake Chad Basin. Natron forms naturally in the deepest part of wadis where the water stagnates. When the water evaporates, a crust of minerals, the *atroun*, is left behind. It is this substance that is subsequently collected. *Atroun* wadis come under the authority of the *canton*



SECTION OF A TYPICAL *ATROUN* MINEPIT

Source: C. Bouquet, 1990 [1.5]

ATROUN WADI - LIWA (BOL), CHAD

***DUGULUM*, OR WHITE *ATROUN*, IS *ATROUN* OF INFERIOR QUALITY**

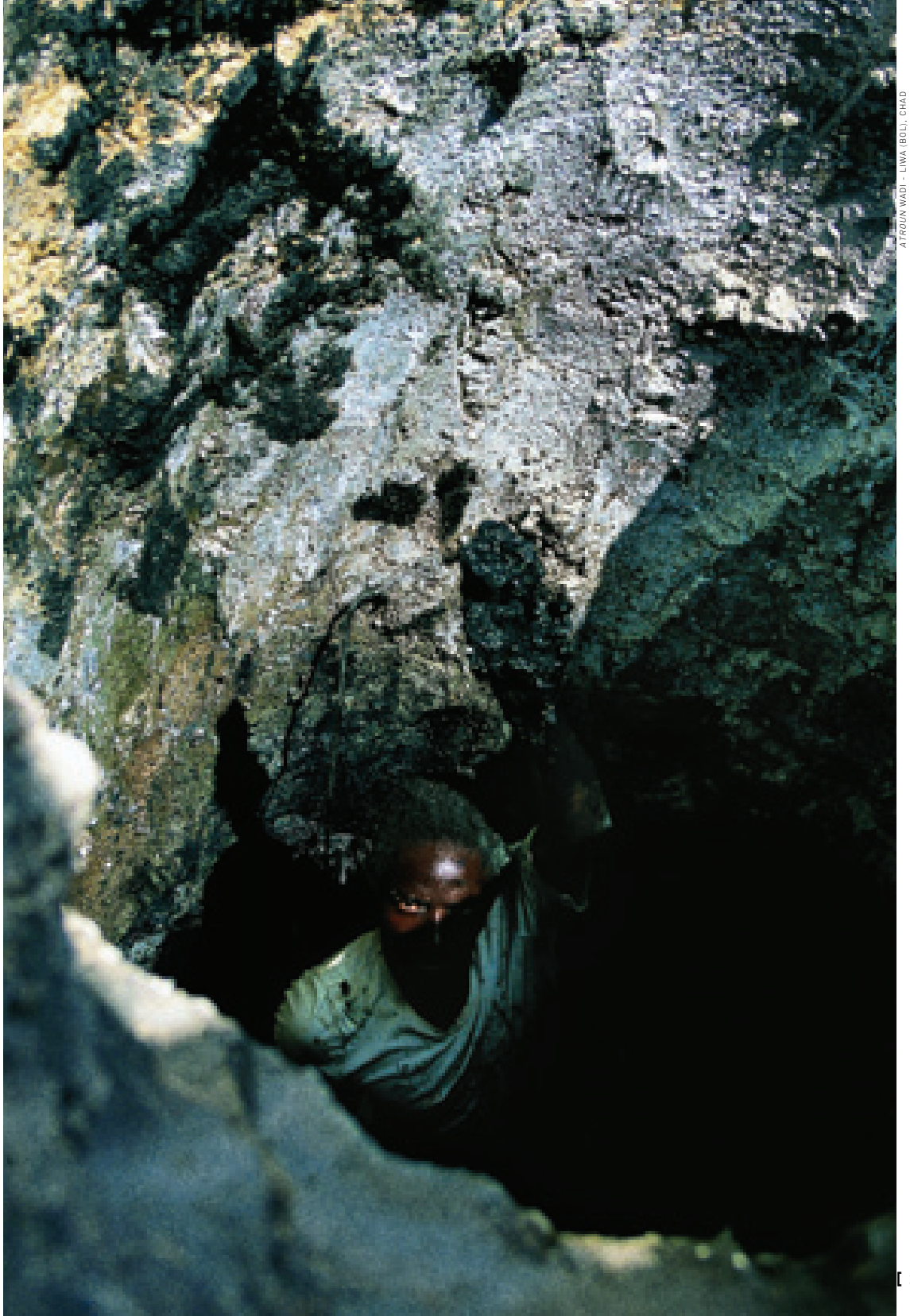
>> RIGHT: ***ATROUN* IS EXTRACTED BY HAND OR WITH SIMPLE TOOLS. ITS EXTRACTION IS EXHAUSTING WORK**

chief, the *Maï*. The mining season runs from December to June and is accompanied by rituals that date back for centuries. To open the season, the *Maï* sacrifices a bull on the shore of the wadi. Traditionally, it is believed that this offering will atone for the sins of the village and ensure that the *atroun* harvest will be plentiful and that there will be no accidents in the minepits.

The extraction itself is carried out by a special caste, the Haddad or salt miners, who are among the lowliest and poorest members of the community. This work is gruelling, dirty and exhausting. Several hundred miners live in special villages or quarters around the *atroun* wadis where they work. They generally operate in teams of three. One uses the *kormasie*, a long wooden-handled tool with a metal blade, another clears the earth with his bare hands, while the third passes the *atroun* out to the other colleagues.

The mining begins with the excavation of a hole about 1 m in diameter, in a place where a hard stratum of *atroun* has been detected. First, an elliptical slab, usually weighing between 30 and 40 kg, is lifted out of the ground using levers. This is white *atroun*, or white *dugulum*. It is cleaned with a knife and left to dry for two weeks beneath a layer of sand or straw. White *dugulum* is *atroun* of inferior quality.

Working to recover *atroun* from about 1 m beneath the surface, the miner is forced to stand for long periods in a salty mud that is highly abrasive to the skin. As a result, the miners are covered with scratches and sores, although they try to reduce the effects by spreading their exposed skin with butter beforehand. The better-quality *atroun*, or black *atroun*, is found below this level. At this point, working conditions become extremely difficult because the white walls of the minepit reflect the

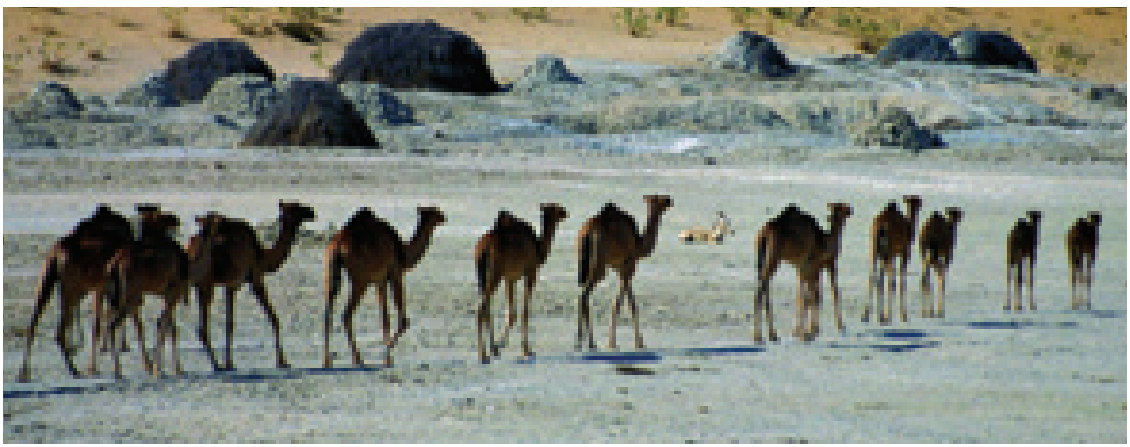


ATROUN WADI - LIWA (BOL), CHAD

ATROUN WADI - LIWA (BOL), CHAD

ABOVE AND BELOW: *ATROUN* IS COLLECTED IN LARGE MOUNDS IN THE WADI AND SUN DRIED
ABOUT 94 WADIS ARE CURRENTLY EXPLOITED FOR *ATROUN* PRODUCTION, MAINLY IN THE NORTHERN REGION OF LAKE CHAD

ATROUN WADI - LIWA (BOL), CHAD



intense heat. The quality of *atroun* improves with depth; closer to the surface, the first, smaller pieces of black *atroun*, weighing less than 1 kg, are extracted from the mud. This is called *tugur*. As the depth increases, the *atroun* gets harder, darker and more compact, and the pieces extracted get larger; this quality of *atroun*, known as *gombul*, weighs 1 kg or more. Finally, the miners reach the best-quality *atroun* – the dense, dark grey *gobkoro* – which is extracted in slabs of up to 30 kg.

SALT PRODUCTION FROM *ATROUN*

Some 94 wadis are currently being exploited for *atroun*, according to recent estimates. Most of them are in the northern regions of the Lake Chad shore, in the Niger and Chad. Average production is estimated at 9.3 tonnes per ha. Most of the *atroun* is marketed in its crude state, while a small quantity is turned into salt.

During the nineteenth century, the production of salt from *atroun* was the main industry in the region. The process, which continues today, albeit on a reduced scale, involves teamwork: men, women or even children [9.2] collect the *atroun* and place it in a large basket made of dum palm fibre, which serves as a filter. The women then pour water over the basket and the solution is collected in moulds made of terracotta or clay and left to evaporate for 24 hours. The salt dries into solid bars. This activity tends to be practised more in dry years when the crop harvests are poor and families need to find alternative sources of subsistence.

BOUDOU ANDJA VILLAGE (DUM DUM), CHAD

ATROUN REPLACES SALT IN ALL TRADITIONAL DISHES

COMPOSITION

Atroun is composed mainly of sodium carbonate, with some sodium chloride (Table 24).

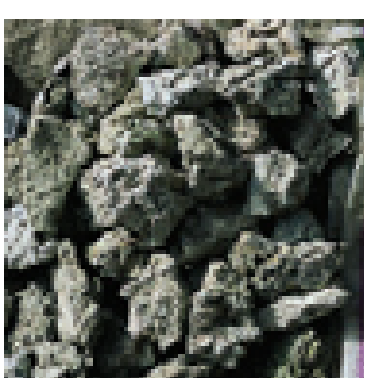
TABLE 24 **CHEMICAL COMPOSITION OF *ATROUN***

CONSTITUENTS	WHITE *ATROUN* *	BLACK *ATROUN* *
Calcium	6.0	6.0
Magnesium	12.5	12.5
Potassium	7.7	1.5
Sodium	1 320.0	1 360.0
Chlorine	40.0	100.0
Carbonates	1 280.0	1 310.0

* Milli-equivalents per 100 g *Source*: C. Bouquet, 1990 [1.5]

USES

The mining of *atroun* is practised on a wide scale in the Lake Chad Basin. Around the lake and beyond, it plays an integral role in daily life in a whole range of settings. In food preparation, *atroun* replaces salt in all traditional dishes. It is used to flavour sauces and local cereal dishes, and to tenderize *niebé* and meat. A study in Chad estimated that annually 78 g per person are consumed by farmers, while 155 g per person are eaten by pastoralists [9.3].



THERE ARE MANY TYPES OF *ATROUN*, DIFFERING IN COMPOSITION, COLOUR, QUALITY AND PRICE

Atroun also has many other applications. It is used as a food supplement for livestock, particularly camels and horses. According to one estimate, between 12 and 15 kg of *atroun* are consumed annually by every camel in the Ati region [9.3]. The benefits are reportedly many. Herders regard *atroun* as an important tonic for their animals and claim that, if it is not consumed on a regular basis, cattle and small ruminants fail to thrive. It is also thought to stimulate growth and fertility in animals and to be an effective antiparasitic. In veterinary medicine, *atroun* is administered as a laxative and as a treatment for colic.

Generally, *atroun* is added to the drinking-water of livestock or is mixed with the residues of millet, maize or sorghum in their feed. However, too high a concentration of *atroun* can provoke rather than cure colic, and animals will refuse to drink from water that contains too much of it. As well as adding it to their food, local people mix *atroun* with tobacco for chewing or smoking. They also use it as part of traditional medicine to treat a whole range of conditions, especially stomach pains. *Atroun* is used for fixing the indigo dye in the manufacture of *boubous* local dresses, for tanning skins and, in Nigeria, for making soap.

NEAR LIWA (BOL), CHAD

A CAMEL CONSUMES APPROXIMATELY 12-15 KG OF *ATROUN* PER YEAR

N'GUIGMI, THE NIGER

A DEPOSIT OF *ATROUN*. THIS SALT IS ALSO USED FOR FIXING INDIGO DYE, TANNING SKINS AND MAKING SOAP

N'GUIGMI, THE NIGER

MODERN FORMS OF TRANSPORT FOR A VERY TRADITIONAL PRODUCT

ATROUN WADI - LIWA (BOL), CHAD

PRODUCTION AND TRADING METHODS SHOULD BE FURTHER INVESTIGATED IN ORDER TO PROVIDE A BETTER QUALITY OF LIFE FOR PEOPLE WHOSE LIVELIHOODS DEPEND ON *ATROUN*

MARKETING

The price of *atroun* and the strategies for marketing it vary according to the quality of the mineral on offer. The highest grade of *atroun*, *gobkoro*, sells for 20 000 CFAF* per 75 kg bag, mainly for use in pharmaceutical preparations designed to treat human gastric and muscular ailments and in ophthalmology. *Atroun* is commercialized by traditional *canton* chiefs, important traders and Haoussa transporters.

Second-grade *atroun*, or *gombul*, is sold by the pile or in pieces. At source, it costs 1 000 CFAF a piece. It is highly valued for the preparation of sauces in many parts of the Sahel and 90 percent of it is exported to the Niger, Nigeria, Cameroon and the Central African Republic, and as far afield as Ghana.

The third grade of *atroun*, or *tugur*, which consists of smaller pieces, is sold at local markets in sacks, three chunks at a time. This is mostly bought by pastoralists, for a price of 500 CFAF a sack, to treat their animals, generally two or three times a year.

Central governments have little control over this activity and it is therefore difficult to monitor and include it in national budgets and in regulations.The production and trading of *atroun* should be further investigated and developed with a view to improving the extraction process and, above all, to providing a better quality of life for the people exploiting it.

* 1 000 CFAF are equivalent to 1,52 euros.

ATROUN-WORKER – N'DJAMENA, CHAD

***DIHÉ*-HARVESTER** - BOUDOU ANDJA VILLAGE (DUM DUM), CHAD

LAKE OF AMEROM (DUM DUM), CHAD

DIHÉ IS AN EXTRAORDINARY PRODUCT THAT GROWS NATURALLY IN THE UNIQUE WATER-POOL ENVIRONMENT TO THE NORTHEAST OF LAKE CHAD

DIHE'

HISTORY

In 1964, the botanist Jean Léonard first witnessed the strange spectacle of what appeared to be a blue-green alga growing in the wadis of the Bol region and began documenting this extraordinary natural phenomenon. He observed that as much as 70 percent of the food intake of the Kanembu tribe was accompanied by a sauce made with desiccated tablets of the alga, which they called *dihé*. He also noted that people who used *dihé* in their diet appeared healthier and in generally better physical shape than people who did not use it.

The alga itself became known by the name of *Spirulina*, and its nutritional value was confirmed in 1974 by the United Nations World Food Conference [9.4], which declared that it was an outstanding foodstuff for the future.

In the meantime, as had happened with other types of algae, a few companies, mainly in Japan and the United States, started to farm it commercially. In 1981, following an article in an American tabloid highlighting its dietary advantages, the international market for *Spirulina* took off and, since then, has grown almost continuously.

Unfortunately, the celebrity of *Spirulina* was not shared by *dihé*, which continued to be produced and consumed within the local market of the Lake Chad Basin and which did not experience any particular increase, either in quantity or in commercial value.

LAKE OF BOUDOU ANDJA (DUM DUM), CHAD

KANEMBU HADDAD WOMEN HAVE DEVELOPED SIMPLE AND EFFICIENT METHODS OF HARVESTING AND PROCESSING *DIHÉ*

THE ENVIRONMENT

Dihé grows in the very peculiar and unique environment of the water pools that form to the northeast of Lake Chad at the end of the rainy season. These are characterized by the following conditions.

- An aquatic environment with a basic pH of 9.5–10.5.
- Saline or brackish water, particularly rich in sodium bicarbonate (10–20 g per litre).
- A daytime temperature of 35–37°C and a night-time temperature of 15–20°C.
- Abundant sunshine.

It is an ecological niche where hardly any other living organism can survive. The development of *dihé* in the Bol area excludes the proliferation of other organisms for the following reasons.

- By feeding on carbonates and bicarbonates, *dihé* increases water alkalinity from pH 9 up to pH 12.5.
- The deep blue filaments form a shield against sunlight, thereby inhibiting the proliferation of algae such as *Chlorella*.
- *Dihé* may possibly discharge defence molecules that are very active against a whole range of bacteria. (*Dihé* is traditionally used to treat gangrenous wounds.)

LAKE OF AMEROM (DUM DUM), CHAD

HARVESTING OF *DIHÉ* TRADITIONALLY STARTS AT THE END OF THE RAINY SEASON