POST EXPEDITION FIELD and STATUS REPORT

Heavy metal deposition and mineral-fluid interactions
in a peat bog from Black Forest, Germany

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GRK273

fig 1: General view of the Kohlhütten Moor

PREFACE

This report is submitted to the respective agencies and persons who have supported the project or have substantial interest in the results. It primarily provides a public record of the field work, detailing how and where peat and other environmental samples, including plant samples were taken for later analysis and dating. Additionally, the present status of the samples is given.
The present project is part of the Ph.D. programm: "Graduiertenkolleg 273" of the Earth Sciences Faculty of the University of Heidelberg, funded by the "Deutsche Forschungsgemeinschaft (DFG)".

ACKNOWLEDGEMENTS

The author wish also to thank the following people for their encouragement, support and assistance:
the "Regierungspräsidium Freiburg" (Sabin Person, Kaiser Joseph Str. 167, 79098 Freiburg),
Prof. Antonio M. Cortizas (University of Santiago de Compostela, Spain),
Ms. Nicole Rausch (University of Heidelberg, Germany) ,
Mr. Nicolas Givelet (University of Bern, Switzerland),
Mr. Michael Goddsite(Odense University, Denmark).

DISCLAIMER

The ideas and opinions expressed in this report are the authors alone. They do not necessarily reflect the opinions or ideas of the funding agencies, employers, or corporate sponsors.

Respectfully submitted by

Gaël Le Roux, Prof. William Shotyk, Dr. Bernd Kober
Heidelberg, Germany,

ABSTRACT

This field report describes the field expedition undertaken between Friday 14th June 2002 and Sunday 16th June 2002 in Black Forest Germany.

A 6 meters long profile (peat and organic sediments) were collected with a Ti Wardnaar corer (down to ~100cm) and a stainless steel Belarus corer (~100cm-600cm). They will provide a new record of paleoenvironmental changes in south Germany.

Subsamples will be analysed for major elements, trace elements, Pb and Sr isotopes, pollen and macrofossils. Selected sections will be analysed with microprobe instruments to understand fluid-mineral interactions in such environments. Plants samples were collected providing a record of actual atmospheric deposition.

I. GENERAL INFORMATION

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TRAVEL

On Friday 14th June 2002, A.K. Cherburkin, B. Kober and G. Le Roux drove with Bernd Kober´s private van to the hotel near the site to survey the bog "KohlhüttenMoor". The depth profile was done on Saturday 15th June the morning.
A.M.Cortizas, H.Küster, T Nørnberg and W.Shotyk came on Saturday afternoon with William Shotyk´s private car.

ACCOMMODATION

The team slept in the hostel "Hirschen" (http://www.hotel-hirschen.de).

LOGISTICS

The material was transported with the van.

II. PEAT CORE SAMPLING

The southern Black Forest is an ideal area to find ombrotrophic peat bogs which could be used as an archive of paleoenvironmental change ***(Shotyk, 2001)***, but also as a natural laboratory of chemical weathering. The precipitation is very high (>1000mm/y, see fig 1) and the average annual temperature in the year is around 5°C. The snow cover extends are between 100 and 150 days in the year (NationalGeographic, 2002).

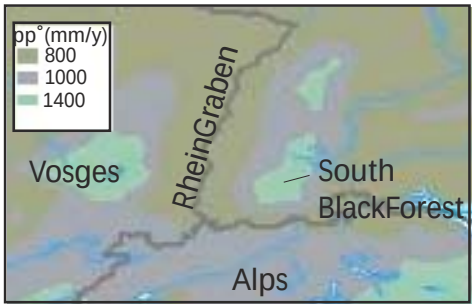

fig 1: Precipitations Map in Black Forest.

SITE LOCATION

Three sites were located during a previous, exploratory trip. One (Kohlhütte Moor) is situated on granite so it is ideal to study weathering in the interface between peat deposit and a rock well known characterized (Kober, 1983). Because of the unexpected depth of this bog (~6m it was not necessary to collect addtionnal peat cores from any other sites The coordinates of this site are **N 47°,44´,697/E 008°,02´, 544/ z=1044m**.

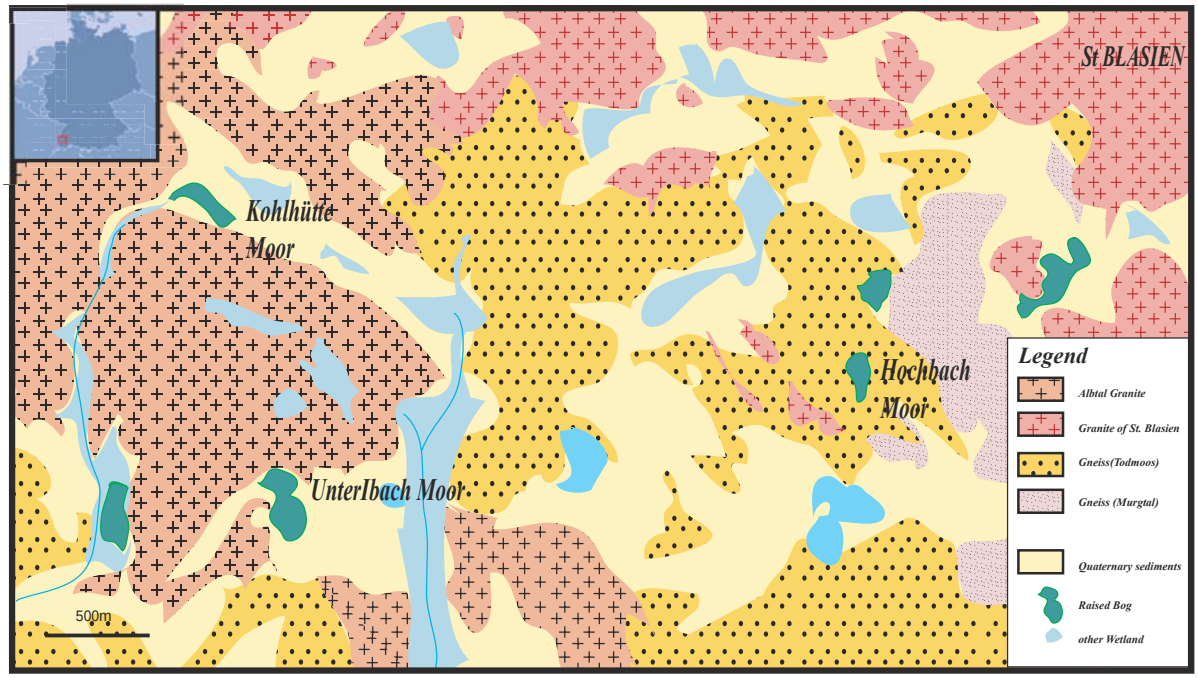

fig 2: Geological map of the sampling area

RECONNAISSANCE AND SURVEY

Survey was conducted with a Global Positioning System (GPS), handheld receiver, compared with another GPS and verified by plotting on topographic maps.

Reconnaissance was based on the preselection previously done by William Shotyk, Bernd Kober, and Hansjörg Küster in a previous short field trip.

Depth profile of Kohlhütte Moor was done by A. Chebrukin and G. Le Roux with the Ti extension of the Ti Belarus Corer.

EQUIPMENT

All the equipment as well for the transport as for the sampling was provide by Prof. Dr. William Shotyk, shotyk@ugc.uni-heidelberg.de, Director of the Institute of Environmental Geochemistry, University of Heidelberg in Germany.

List of the equipment:

2 Wooden core boxes
Ti Wardenaar corer
Ti pry bar and 2 Ti lifting rods
Stainlesssteel Belarus corer,
Ti extension of the Belarus corer,
Lake sediments corer

Sledgehammer
Tool kit (wrenches, screwdrivers, knifes, nails, screws)
Set of knifes
Hatchet, shovel
Polyethylene film
Plastic bags
Garbage bags
Aluminium foil
25 ml plastic bottles for water sample
PET gloves
Emergency kit
Permanent markers

EXPEDITION PLAN

The primary goals of the expedition can be summarised as follow:
- to locate and determine the suitability of some peat bogs in Black Forest, Germany, for the study of mineral-fluids interaction and to develop an historical record of heavy metals deposition.

- to obtain Wardenaar cores and Belarus cores.

- to collect plant samples, surface water samples and make observations at the coring site.

GENERAL NOTES

Permissions: Prof. Shotyk and Dr. Kober have secured the permission of the Regierungspräsidium Freiburg for taking cores and samples in the nature reserve.

Route Planning and Navigation: B. Kober and H. Küster guided the expedition team.

Method: Cores were removed using a 15 x 15 cm Ti Wardenaar corer (first meter) and then with the Belarus corer for the next 5m until the corer could not get further. Belarus cores (length c.a:50cm) were alternatively taken in one hole done first by hand (hole B) and in the hole made by the Wardenaar corer (fig 5, fig 8). Descriptions of the cores were done (ca. length, possible layering, texture, changes in moisture and colours). Cores photographed and wrapped with polyethylene film, then plastic, and sealed in core boxes. Cores were frozen at -18°C in Heidelberg for storage.

fig 3: The Wardnaar corer is pushed down in the peat.

fig 4: The Ti corer is opened carefully.

fig 5: The Stainless steel Belarus corer is pushed down alternatively in a second hole and in the first hole done by the Wardnaar corer.

Detailed Description of the site:

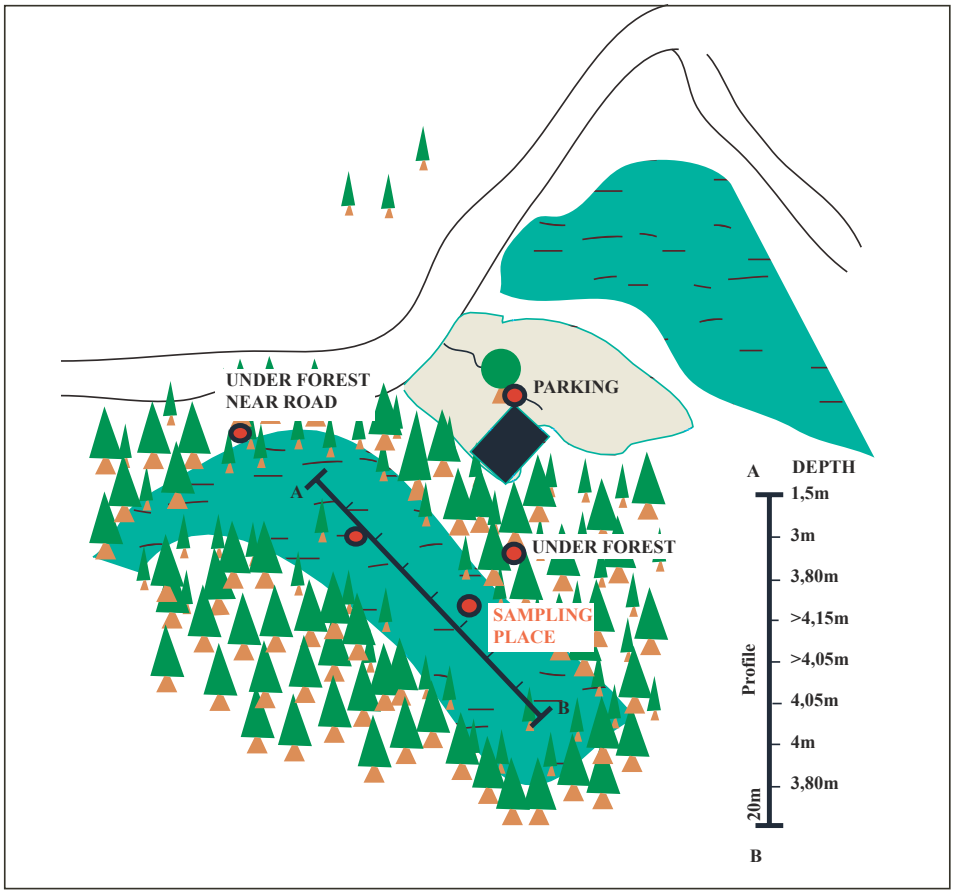

fig 6: detailed map of the Kohlhütte Site

The site is a peat bog dominated by sphagnum species (i.e.: *angustifolium, magellanicum*..) surrounded by spruces *(picea sp.)* (fig 6). The depth profile shows that the point with the bigger accumulation is situated in the middle of the bog. The dome is visible to the naked eye widthwise.
Some lichen species are situated on the spruces and were sampled (fig 7).

fig 7: sampling of lichen on a spruce situated in the peat bog

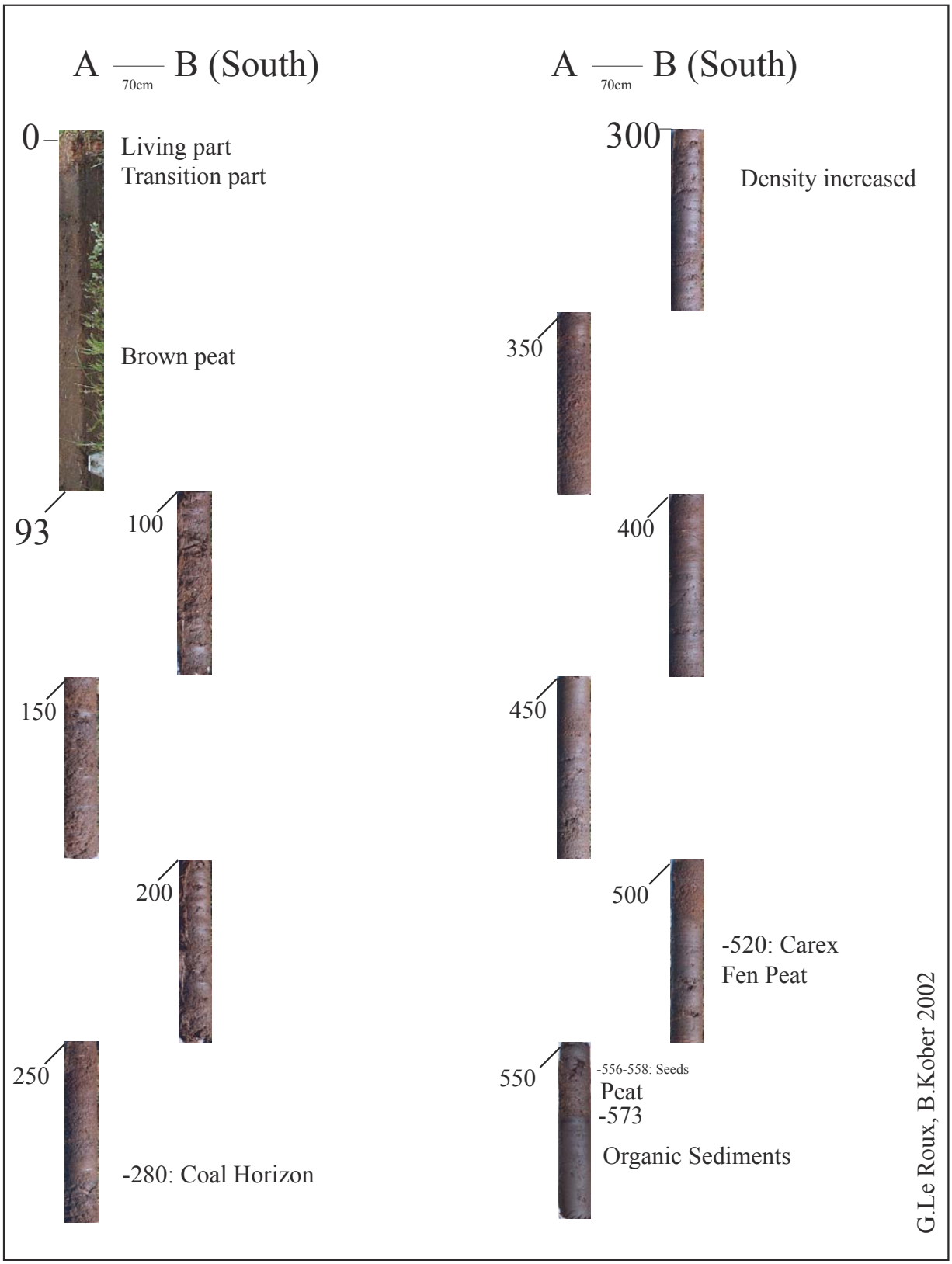

fig 8: Global description of the cores

fig 9: limit between the fen peat (left) and the organic sediment

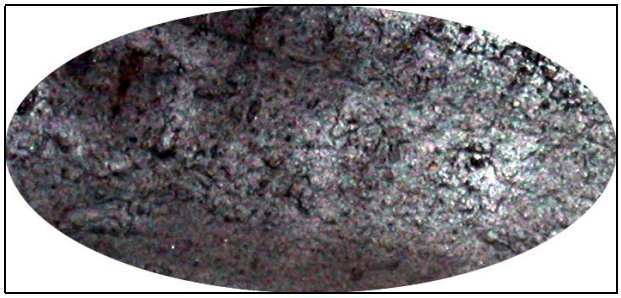

fig 10: detailed view of a sediment slide with quartz macrominerals (brilliant point)

fig 11: detailed view of a peat slide with seeds and wood pieces

General remaks on the core:

Photos of the cores and a short description are given in the figure 9. At the depth of 573cm, we reached a dark horizon characterising the limit between the fen peat and the organic sediments (fig 9). These mineral sediments contain abundant minerals grains visible to the eye (fig 10).
In the peat cores, numerous samples contain pieces of wood or seeds which can later be used for ^{14}C age dating using accelerator mass spectrometry (AMS) (fig 11).

STATUS OF STUDY

The present status of our study as of the 1st Sept., 2002 is briefly as follows:

All samples are archived frozen at –18°C at the Institute of Environmental Geochemistry, University of
Heidelberg in Germany.
- **Wardnaar core** will be cut precisely into 1cm slice in September 2002. A new cutting table is being built for this purpose.
- **Belarus cores** have been cut into 1 cm slices using a stainless steel electric saw (deisgned and built by T. Nørnberg).
- All slices (every second slice for Belarus peat cores) will be subsampled and studied at Heidelberg for major elements chemistry (XRF, ICP-OES), trace elements (XRF, ICPMS, GFAAS, IDMS), isotope chemistry (TIMS, ICPMS) and mineral anlysis (microprobe XRF, Raster Microscope and for pollen and macrofossils analysis by Prof. H.Küster, University of Hannover).
- The bottom of the core will be dated with a macrofossil of *Equisetum* collected at a depth of 592 cm with ^{14}C AMS dating at ETHZ (Dr. Georges Bonani).

fig 12: cutting of Belarus sediment core

- **Water samples** will be measured using ICP-OES.
- **Plant samples** collected during this trip and previously are being measured by Dr. A.K. Cheburkin in Canada for ^{7}Be, ^{210}Pb using Gamma spectrometry and for trace elements using XRF.

→ Nomenclature of Black Forest Plants Samples:

location/date
type of samples/name

(Unter)IBACH MOOR (4.05.2002)
Green Sph.: living part (IM 17)
Dead part (IM 20)
Peat: z = 190cm (IM 14)
Peat: z= 150 cm (IM 25)

HOCHBACH MOOR (4.05.2002)
Red Sph.:
Under Water: living part (HM 1)
Dead part (HM 3)
Surface (*Green Sph*.): dead part (HM13)
Surface (*Brown Sph*.): living part (HM 8)
Dead part (HM 20)
Surface (*red Sph*.): living part (HM 18)
Dead part (HM 19)

OBERIBACH (KOHLHÜTTE) MOOR (4.05.2002)
Red Sph.: living part (Ob 1)
Dead part (Ob 2)
Other plant (same sample) (Ob 3)
Peat: z = 1,80m (Ob 18)
Peat: z = 1,70m (Ob 19)
Peat. z = 1,40m (Ob 27)

KOHLHÜTTE MOOR (15.06.2002)

Sph. Red-Green (sampling spot): living part (KL 13)
dead part (KL 23)
transition (KL 10)
Sph. Green under trees: living part (KL 19)
Dead part (KL 18)
Underg. (KL 17)
Red. Sphagnum (sampling spot): living "head" (KL 5)
Dead part (KL 1)
Under forest near road:*Sph.green*.
living part (KL 20)
Dead part (KL 21)
Gouille near pause place (under water): peat (KL 15)
Green part (KL 9)
Green Sph. R.G.: living part (KL 8)
Dead part (KL 6)

Lichens:
KLL1: under forest near road

KLL2: sampling place
KLL3: parking

N.B.: all rocks and plants samples are also available in little plastic bag for specie determination.

SUMMARY:

A complete peat profile was collected in Black Forest, Germany. This peat profile will be suitable for a long term record of atmospheric elements deposition, and a study of weathering of aluminosilicates in a acid, organic rich environment.

Bibliography:

Kober B. (1983) Gesteins-und Mineral-Analysen des südlichen Schwarzwaldes (in Deutsch), Ruprecht Karl Universität Heidelberg.

NationalGeographic. (2002) Snow cover map. http://plasma.nationalgeographic.com/mapmachine/.

Shotyk W. (2001) Geochemistry of the peat bog at Etang de la Gruère, Jura Mountains, Switzerland, and its record of atmospheric Pb and lithogenic trace metals (Sc, Ti, Y, Zr, and REE) since 12,370 14C BP. Geochimica et Cosmochimica Acta 65(14), 2337-2360.

APPENDIX I:
Copy of coring permit

REGIERUNGSPRÄSIDIUM FREIBURG

Regierungspräsidium Freiburg • 79083 Freiburg i. Br.

Universität Heidelberg
Prof. Dr. William Shotyk
Im Neuenheimer Feld 236

69120 Heidelberg

Freiburg i. Br., 03.06.2002
Durchwahl (07 61) 2 08- 1230
Name: Frau Person
Aktenzeichen: 56-8841.06/WT

Befreiung von den Naturschutzgebietsverordnungen „Horbacher Moor“ und „Kohlhütte-Lampenschweine“, Gemeinde Ibach, Landkreis Waldshut
Ihr Schreiben vom 08.05.2002

Sehr geehrter Herr Prof. Dr. Shotyk,

in obiger Angelegenheit ergeht auf Ihren Antrag vom 08. Mai 2002 folgende

E N T S C H E I D U N G :

Das Regierungspräsidium Freiburg - Höhere Naturschutzbehörde - erteilt Ihnen, gemäß §§ 62 und 63 NatSchG i.V. mit den beiden Schutzgebietsverordnungen die naturschutzrechtliche Befreiung von den Betretungsverboten in den Naturschutzgebieten „Kohlhütte-Lampenschweine“ und „Horbacher Moor“ im Kreis Waldshut.

Diese Befreiung wurde von Ihnen beantragt , damit Ihre Arbeitsgruppe und die der Universität Hannover das von der DFG geförderte wissenschaftliches Projekt an Hochmooren im Gebiet St. Blasien /Todtmoos durchführen kann.

Diese Verfügung ergeht unter folgenden Auflagen:

1. Wir bitten, die Begehungen nicht an Samstagen, Sonntagen sowie sonstigen arbeitsfreien Tagen durchzuführen.

2. Es sind nach Möglichkeit die vorhandenen Pfade zu benutzen, so dass keine neue Trittspuren entstehen.

3. Auf Fauna und Flora ist größtmögliche Rücksicht zu nehmen.

4. Die Untersuchungen sind im Juni durchzuführen.

5. Diese Genehmigung ist während der Untersuchungen mitzuführen und auf Verlangen den berechtigten Personen vorzuzeigen.

6. Nach Abschluss der wissenschaftlichen Arbeiten wird um Übersendung eines Berichts gebeten.

Diese Entscheidung ist gemäß § 5 Abs. 1 Ziff. 7 Landesgebührengesetz gebührenfrei. Diese sachliche Gebührenfreiheit kann gewährt werden, wenn Untersuchungen überwiegend im öffentlichen Interesse durchgeführt werden.

Begründung:
Die Universität Heidelberg und die Universität Hannover planen im Rahmen eines von der DFG geförderten Projektes die Entnahme von Bodenproben mittels Bohrkern in den beiden genannten Naturschutzgebieten. Der Antrag wurde von der Bezirksstelle für Naturschutz und Landschaftspflege positiv beurteilt.

Diese Ausnahmegenehmigung steht gemäß § 63 NatSchG im Ermessen der Behörde. Dies ist rechtsstaatlich begrenzt durch den Grundsatz der Verhältnismäßigkeit, d. h. die Entscheidung der Behörde muss geeignet, erforderlich und angemessen sein. Die Ausnahmegenehmigung ist grundsätzlich geeignet, um ihrem Antrag entsprechen zu können. Sie war, insbesondere hinsichtlich der im Tenor genannten Auflagen, erforderlich und angemessen, um die betroffenen Gebiete vor nachteiligen Beeinflussungen zu schützen.

Gegen die Entnahme von Torfbohrkernen in den beiden angeführten Moorbereichen bestehen keine grundsätzlichen Bedenken. Da aber beide Gebiete im Bereich von Freizeiteinrichtungen liegen und erfahrungsgemäß vor allem an Wochenenden stark

frequentiert werden, bitten wir den Zeitpunkt für die Kernentnahme auf einen Werktag im beantragten Zeitraum zu verlegen.

Rechtsbehelfsbelehrung

Gegen diesen Bescheid kann innerhalb eines Monats nach Bekanntgabe Klage beim Verwaltungsgericht Freiburg, Habsburgerstr. 103 in 79104 Freiburg i. Br., erhoben werden. Die Klage ist schriftlich oder zur Niederschrift des Urkundsbeamten der Geschäftsstelle einzulegen. Die Klage muss den Kläger, den Beklagten und den Gegenstand des Klagebegehrens bezeichnen.

Mit freundlichen Grüßen

Person

II.
Nachricht hiervon

Bezirksstelle für Naturschutz
und Landschaftspflege Freiburg
Herr Genser

im Hause

auf die Stellungnahme vom 27.05.02 8841.04/2258/GS/si mit der Bitte um Kenntnisnahme.

gez.
Person

III.
Wv. 01.01.03