

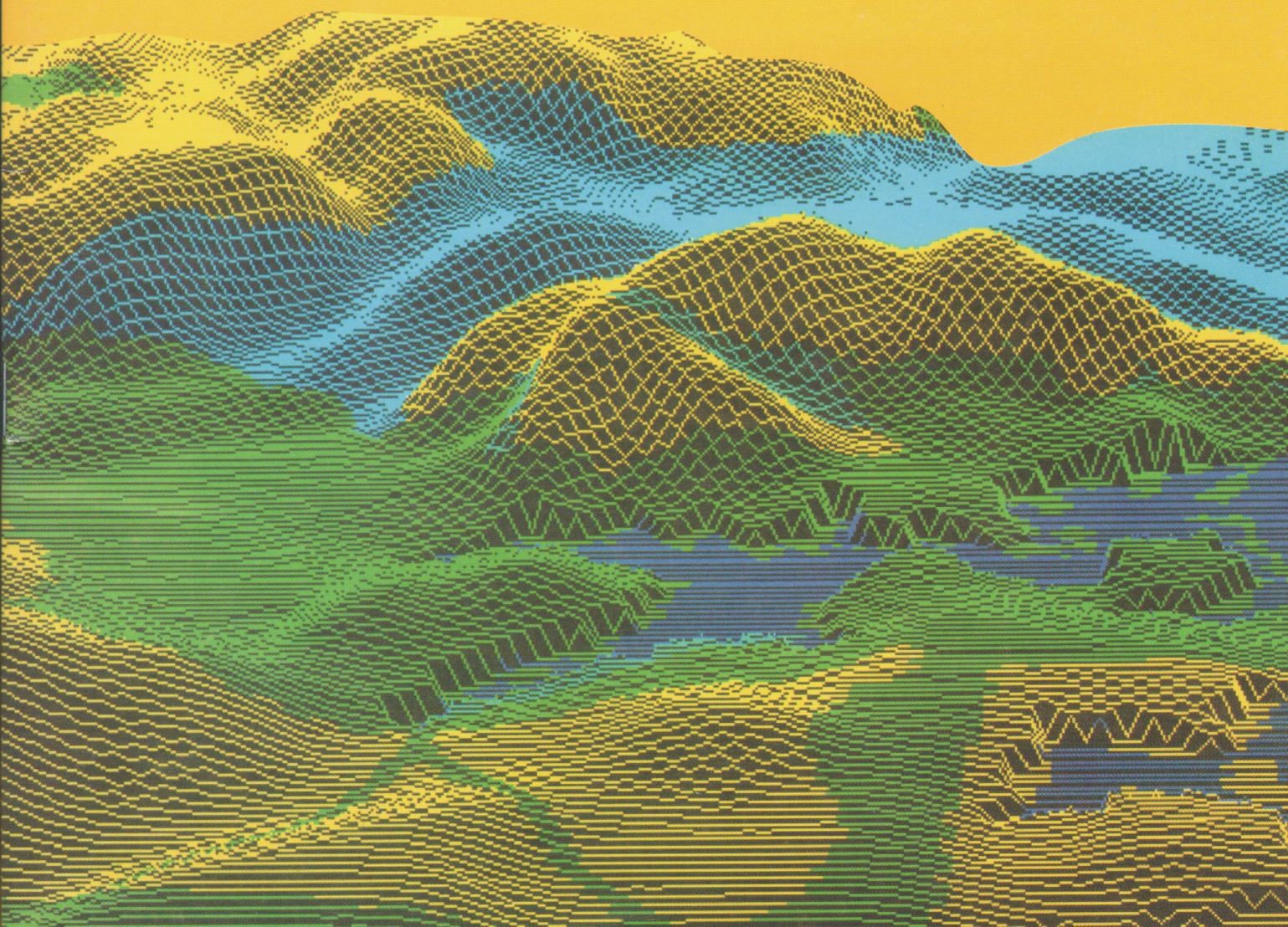
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THE REGISTRATION OF AREAS OF SUSPECTED CONTAMINATION REGARDING DUMPS IN THE BRNO CONURBATION

Wolfgang FISCHER - Pavlína HLAVINKOVÁ

1. Introduction

With regard to efforts of the Czech Republic to become a member of the European Community, attention must be paid not only to economic restructuring but also to ecologically political aspects such as environment protection. In the EC countries, and namely in Austria and Germany, the environmental protection plays a very important role thanks to Green groupings at the beginning and Green parties later on.

Besides the environment-friendly production of industrial plants, noise and exhaust-reduced traffic to mention but a few, there is also a question of sins regarding the environment that were committed years ago, which becomes ever more topical. Especially former waste deposits are in the first place of importance.

Since December 1993, a teamwork between the Institute of Geonics in Brno and the Department for Applied Geography at the Institute of Geography, Karl-Franzens-University in Graz has been running tests in a certain experimental area on the methodology of inquiry and the following valuation of former waste deposits in the municipal area of Brno. All these legal or illegal dumps are - with no exception - a potential jeopardy to environment. In the future, necessary steps have to taken for protection and rehabilitation. In the course of the work, these working methods which have already been applied in Germany and Austria are tested for their applicability in the Czech Republic.

Objectives of the first stage of the project shown in this paper consist in a complete registration and localization of all previous waste deposits, creation of a statistic digital data basis (page number of the respective topographical map, numerical order of the area, description of the site, depth, length and width of the area, deposit form, geological situation, hydrogeological situation, change during the period of project implementation, topical use) to obtain a direct comparison of the locations and also the photographic documentation.

2. Area of the project

The area under study is of about 115 km² and it is situated in the SE direction of Brno (Fig. 1). In its NS expansion it extends from Maloměřice to Tuřany, its WE expansion then stretches from Vídeňská street to Šlapanice. This area was deliberately chosen because of its high possibility of finding a large concentration of dumps there. On the one hand, the geological subsoil consists mainly of Quaternary and Tertiary loose materials. In the other hand, it consists also of limestone. Sands, gravel and limestone are subjected to extensive mining in gravel-, sandpits and limestone quarries. These concave surfaces which came into existence through erosion or due to anthropogenic influence offer the best opportunity to be used as dumps. Not only waste management companies but also individuals use the possibility of depositing wastes consisting of rather varied waste products. After having been filled, the deposits are mostly covered with soil or debris so that later on, many of these locations may not be recognized as the former waste deposits.

When talking about danger to our environment consisting in waste deposits, we are also talking about jeopardy to groundwaters (odours - for instance - are considered to be rather a form of impairment to environment). In some parts of this area, the groundwater

is shallow, and a very fast pollution may occur in the case of a possible release of harmful pollutants.

3. Method of work

The working method is based on utilization of different sources of information as well as on the fieldwork. After gathering documentation such as aerial pictures or maps, which often can be differing in their quality, their interpretation is affected multitemporally. In other words, the aerial pictures and maps are a subject of comparison analysis which may take several decades.

3.1 Sources of information

The aerial pictures, maps and plans, files, studies, reports, test results, inquiries and inspections in the locations can be considered information sources (Huppert - Nieder, 1992).

3.1.1 Aerial pictures

Aerial pictures which a direct reproduction of reality offer high meaningfulness as regards to their content. As an indirect information method for maps of areas suspected of being polluted, the aerial pictures seem to be very good. But the aerial pictures describe a certain part just at the time when the photograph was taken from the air realistically in detail (temporal). For that reason, registration of the Brno conurbation should be made from several aerial picture time-series (multitemporal). For this method of multitemporal aerial picture interpretation, the aerial pictures made in 1953, 1969 and 1990 are available.

Besides the temporal components, physical distribution of disposal locations also plays a very important role. If it is possible, the spreading can be found out as very clear plots but it depends on the scale of aerial picture material. Concerning the aerial picture interpretation, the usual scales are from 1:5 000 to 1:25 000. For the project under study, aerial pictures on a scale of 1:25 000 can be obtained from the aerial picture station at the military institute of cartography in Dobruška. However, a really plot-sharp registration of topical and previous waste deposit locations in the project area in the course of stereoscopic utilization by the Institute in Graz can in some parts be very difficult because there is a quality difference among the individual aerial pictures. The desirable, original scale of 1:10 000 that is possible to get in Austria and Germany is just to get the phototechnical blow-up of the 1:25 000 aerial pictures. Therefore, no optimum result can be ex-

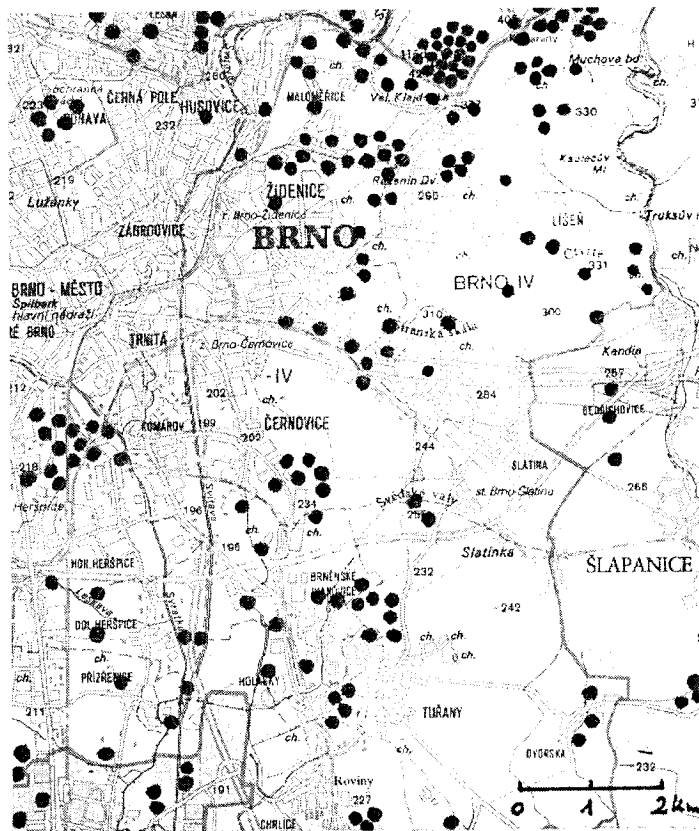


Fig. 1 Project area and spreading of suspected former waste deposits found

pected. For this reason, the maps are used as the sources of information in the course of this project from its early beginning.

3.1.2 Maps

In comparison to aerial pictures, maps have a disadvantage of being generalized as regards their contents and facts. In the project work, however, they are a supporting and important medium with their interpretation being in addition more reliable with the help of the legend than that of the aerial pictures. Very careful map reading is a matter of course, though. Topographic maps available on a scale of 1:10 000 are those from 1960, 1975 and 1991. The present municipal area is densely populated. For its mapping, there is a possibility of using historical maps of the town on a larger scale. Searching those maps of a different time-series, one is constantly confronted with a problem concerning availability. Our experience from the course of the project work indicated that many single map sheets are not available also due to personnel change in the Institute after the recent transformation.

Besides the elicitation of the physical spreading of locations during different periods with the help of topographic maps, thematic maps can also be very useful. They are used to assess danger wherever it concerns geological subsoil, natural geomorphological forms or hydrogeological relations. But these maps are mostly available on a scale of 1:50 000. For this reason, they often exhibit too much inexactness, especially in the individual locations situated on the limits of two geologically different types of rocks. In these cases, one has to return to the inspection of the site.

3.1.3 Other sources of information

In addition to the aerial pictures and maps, important are also maps, files, reports, studies and results of tests. Very detailed facts can be obtained by inquiring at offices and institutions. Willingness to cooperate is provided which of course is not given on the basis of the lack of interest in former waste deposits. One mostly comes across scepticism and it lacks information. In addition, no materials are available because there has never been made any study or report. That is so in the area of inquiry. An insight into the properly kept company files would be great but is nearly impossible.

All sources have to undergo a discussion in which following questions must be answered (Huppert - Nieder, 1992):

- *Is the use of all these sources possible also in practice?*
- *What sources are necessary at all for the first registration of previous waste deposits?*

A conscientiously multitemporal interpretation of topographical maps assisted with some aerial pictures is necessary for the project in the Brno conurbation for the first registration as well as an inspection of the site, which takes a lot of time - or in other words, the first stage of the project will necessarily take some 10 months.

3.1.4 Inspection of sites and inquiries

Both inspection to the sites and questioning are indispensable working steps in order to register the former waste deposits. Both are used for addition and verification of information sources mentioned above. In addition, recent changes concerning the usage can be discovered. Especially the question concerning the present use that cannot be found out of the topographical maps made in 1991 is of the greatest importance (Fischer-Zsilinesav, 1995) with regard to possible ongoing measures such as securing and rehabilitation. One is often faced with problems concerning accessibility of private property. Problems arise in deposition areas unclear in terms of their documentation. Hand-made sketches, photographs and written notes must be traced by questioning and site inspections.

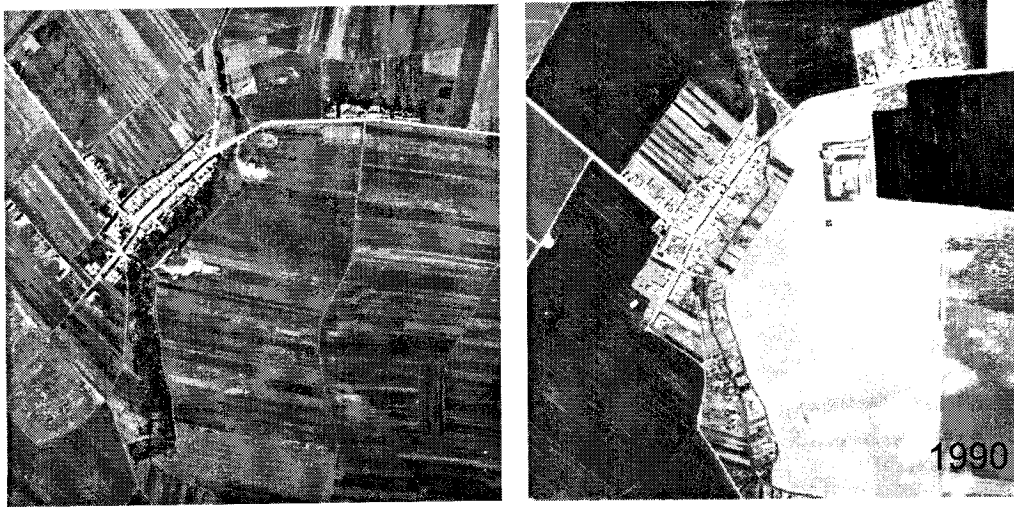


Fig. 2a Aerial photograph section of Dvorska village from 1953 (approx. 1:25 000) and from 1990 (1:26 200) with kind approval of VTOPÚ Dobruška and GŠ-AČR

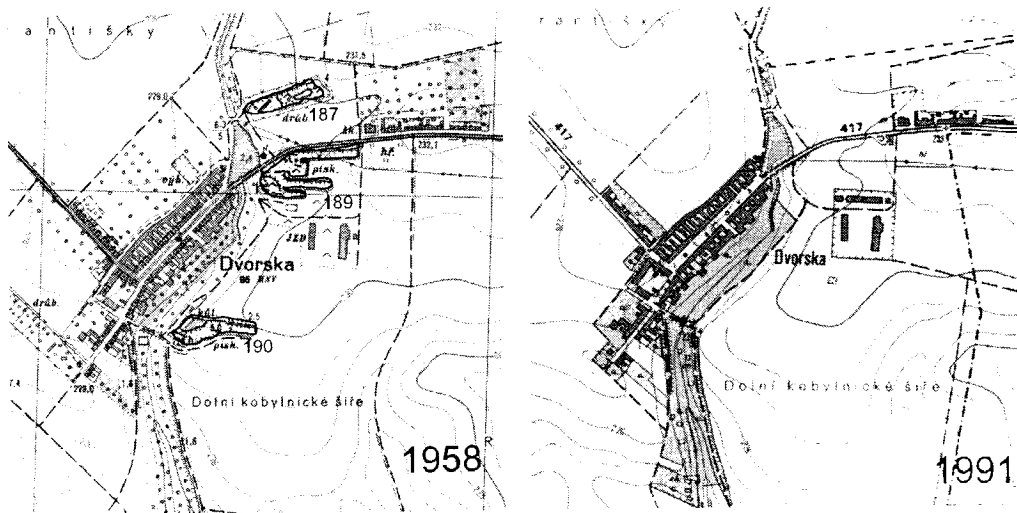


Fig. 2b A section from topographical maps 1:10 000 of 1958 (sheet No. M-33-106-C-b-2) and of 1991 (sheet No. 24-43-06)

4. An illustration example of the working method

From this illustrated example of Dvorska (about 8 km SE of the centre of Brno), the methodology of multitemporal comparison of aerial pictures made in 1953 and 1990 (Fig. 2a) and topographical maps made in 1958 and 1991 (Fig. 2b) is shown briefly. Both sandpits (písk.) (Ifd No. 189, 190) and the used pit which is used as a poultry farm (drůb.) (Ifd No. 187) are clearly recognizable on the aerial picture made in 1953. In comparison to the 1990 aerial pictures, the areas are submerged and totally levelled out. In the course of the inspection right on the spot, old prohibition signs were found of illegal disposition of the dump, which point out that the area is a former waste deposit. Size and depth of the pit can be seen on the map from 1958.

5. Summary

Problems may arise in analysing aerial pictures whose scale is too small. However, with the aid of snaps on a scale of 1:10 000, exact spreading relations can be found out. Site inspection will then clear up all other possible questions. Another problem occurs when evaluating thematic maps such as a map of hydrogeological relations, where the

too inexact reports would have to be made because of the scale 1:200 000. In this case, there is a demand for a sound data basis, in other words for a map with the larger scale.

A specific inquiry is in preparation for neighbours and for representatives of local authorities (preferably old citizens) with regard to the content and usage of deposits with the assistance of prepared questionnaires that are seen as the second stage of the project. With the help of these results, an evaluation of all pollution-suspected areas should be considered.

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