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Urban archaeology and environmental data: the Lyon experience

S. GAILLOT* and E. HOFMANN*

Key words: Urban Archaeology, Geomorphology, Environnement, Lyon, GIS.

Restricted to the perimeter of Lyon, the City Archaeological Service has developed an adapted methodology to better exploit geoarchaeological data in the context of a completely urbanized area.

GENERAL CHARACTERISTICS OF GEOARCHAEOLOGICAL PRACTICES IN URBAN AREAS

Considering environmental factors in the understanding of the shape, function, and even disappearance of archaeological remains, geoarchaeology is submitted to the following constraints in urban environments:

- quasi-complete disappearance of the “natural” landscape, which is, for geoarchaeologists, a key element for understanding morphogenesis (Fig. 1c);
- destruction of most of the Holocene archives: no peat bog exists any longer in Lyon (even if they had existed in the district of Vaise before urbanisation). Stream channels are mostly canalised, and abandoned channels have been filled in. Only some limited sedimentary sequences still have potential for palynological analyses;
- land use regulations excluding from the delineated archaeological perimeter areas of high geoarchaeological interest, such as most of Lyon’s eastern plain (Fig. 1b);

- degradation and restricted dimensions of zones where archaeological surveys are implemented;
- brevity of surveys when implementing preventive archaeology.

Nevertheless, these constraints are compensated by the large number of archaeological surveys (approximately one thousand have been conducted since the end of the 17th century (Fig. 1b), i.e., about ten new surveys a year on average in recent years), and by the density of the archaeological vestiges, the eldest dating back to the Mesolithic.

METHODS AND DEVELOPED TOOLS

During studies, classical field methods are favoured (identification of lithological facies, grain-size analysis, radiocarbon dating, etc.). In some cases, more specific methods are used (magnetic susceptibility, CM image, palynological analyses, identification of malacofauna).

In order for environmental data to be better incorporated in the understanding of archaeological sites, three main strategic orientations have been selected, and two practical tools are being developed:

1. In 2008, the Archaeological Service hired a full-time geomorphologist and set up a scientific partnership with the Department of Geography, University Lyon 2, along

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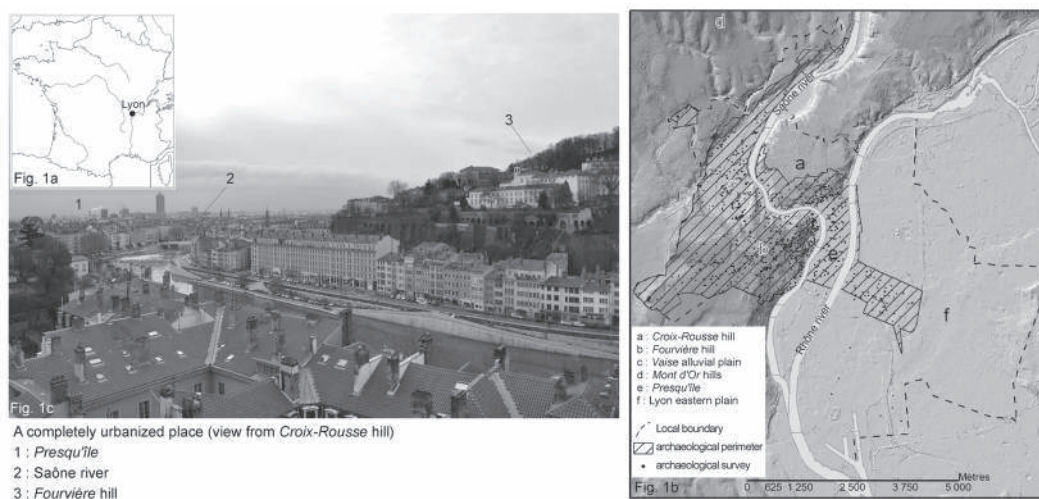


Figure 1: Location of studied sites at a national (1a) and regional level (1b). General view of Lyon (1c).

with collaboration with specialists of local fauna and palynology.

2. A geomorphological database, complementing the archaeological database ALyAS, is being developed. Its objectives are the qualification and georeferencing of all natural layers, associating the facies of deposits (1), processes of deposition (2), and landforms (3). It is being complemented with a thesaurus of landforms (alluvial plains [Fig. 2], hillslopes, etc.).

3. Litho-archives, which are under development cover a wide regional spectrum, including cohesive rocks (crystalline, volcanic, sedimentary, sampled in local outcrops and in ancient buildings), soft rocks and superficial deposits (alterites, till, alluvium, colluvium, soils, etc.). Samples are georeferenced in the geomorphological database.

FOUR CASE STUDIES

1- *Alluvial plain of the Rhône river (Guillotière district, Bernot et al., 2009)*

The site of the future *Sergent Blandan* Park is located in the alluvial plain, on the left bank of the Rhône river (Fig. 3a). The use of an accurate DTM, the detailed study of ancient maps (18th century), and geotechnical surveys (boreholes) suggest the existence of two geographical units, of different ages and with different geoarchaeological attributes:

- fluvio-glacial butte, topped with red soil, constituting a remnant of the *Villeurbanne* terrace; artifacts date back to c. 18,000 BP, i.e., the upper Palaeolithic);
- lower area, possibly a channel of the Rhône river, active over a period of 13,000 years, that is, between 18,000 BP

(Upper Palaeolithic), and 5000 BP (Late Atlantic-Subboreal, i.e., end of the Middle Neolithic).

2- *Alluvial plain of the Saône river (Vaise district – Monin et al., 2008)*

The site under construction located at 4-6 *Mont d'Or* St., in the Vaise alluvial plain, on the right bank of the Saône river, gave a detailed record of alluvial levels. The underlined words in this paragraph are defined in the archaeological and geomorphological thesaurus. The stratigraphy displays deposits of the Saône river channel. River environments changed from wetlands (lacustrine and/or palustrine areas) to active floodplain topped with soils. The site was occupied during the transition from the Early to the Late Iron Age, but was still flooded at that time. Layers of fresh deposits are present in soils, embankments (*remblais*) and levels of occupation since the first phase of occupation, then in the Late Iron Age, during Antiquity (first half of the 1st century AD), and in modern times (layers deposited during the floods of 1856) – Fig. 3b.

3- *Croix-Rousse plateau (so-called “fish bone” galleries) – (Bernot et al., 2008)*

A network of galleries 1.4 km long, featuring a peculiar “fish bone” architecture, has been explored in Lyon (district of *Croix-Rousse*). It connected the summit of the plateau with the alluvial plain of the Rhône at the bottom. A comparison of the limestones from our litho-archives and from the rubble collected from the gallery walls, permitted two origins to be suggested for the building:

- the *Mont d'Or* hills, north of Lyon: “*Couzon*” stone was used in Lyon only after the Renewal period;

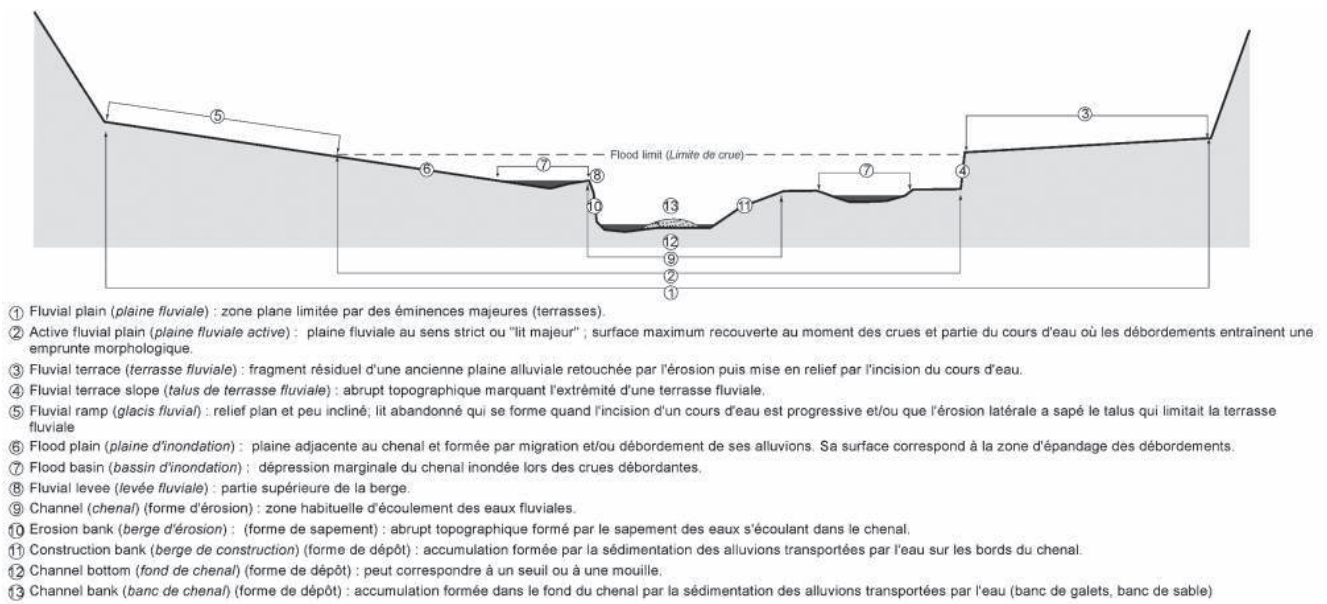
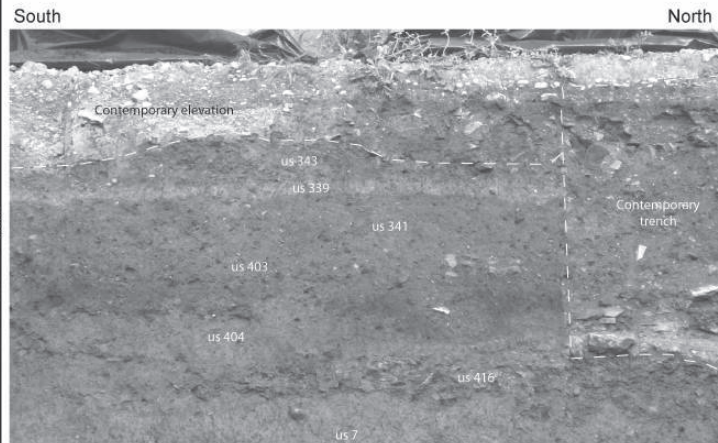


Figure 2: Thesaurus of fluvial forms.



View of protohistorics layers (us 7), antiques layers (us 416 [demolition], 404, 403 embankments [*remblais*]) and modern flood layer (us 339, possible deposit of the 1856 flood).

Figure 3: Two case studies: alluvial plain of the Rhône river, Sergent Blandan park, 2009 (Fig. 3a); alluvial plain of the Saône river, 4-6 Mont d'Or St., 2008 (Fig. 3b)

- quarries in the *Mâcon* hills (right bank of the Saône river), approximately 70 km upstream from Lyon.

The construction of the “fish bones” network may be related to the royal citadel of Lyon, which was built in 1564 on the *Croix-Rousse plateau*, following the order of King Charles IX, and was dismantled in 1585 by request and to the expenditure of the city of Lyon.

4- *Fourvière plateau (Antiquaille)*- Hofmann et al, 2008

The archaeological diagnosis of the *Antiquaille* site, which is built on the slope of the *Fourvière plateau*, below the Roman theatre and odeon, established that the present topography has few points in common with what it was in Antiquity:

- in the area occupied by the Roman city from the first phases of its construction, the archaeological approach has revealed a set of anthropic stepped terraces on a slope that has become entirely smooth over the following centuries;

- geomorphological study, based on the identification of superficial deposits (till, loess and lehm, which is a pedological cover developed on the top of loess), revealed a North-South vale pre-dating urbanization. The soils of this vale and their local reworking, induced by the construction of buildings and the occupation of adjacent land during Antiquity, could be studied. Understanding the impact of antique urbanization on the original topography is rare in urban archaeology.

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