Aspects of Norwegian Waterfront Archaeology:

The Case Study of Trondheim

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Summary

This paper attempts to deal with some of the stratigraphic problems that have been encountered on a large-scale archaeological investigation into a medieval waterfront in Trondheim, Norway. This excavation began in May 1993 and finished during October 1994. The area under examination consisted of a transect 350 m in length and 3 m wide running parallel to and to the west of the River Nid, where the medieval town was settled (Fig.1). The paper centres on recognising the excavated archaeological elements, assessing their influence on the physical townscape and detailing some of the problems in formulating relative and chronological phases.

Norwegian Archaeological Practice

Norwegian urban archaeological practice is based upon the understanding of the order of stratigraphic elements which creates the stratigraphic sequence. This "event archaeology" has been executed by using single or multi-context planning systems and recording those observed elements on context sheets. The sequence is then constructed in the form of a Harris Matrix and from that phases and finally periods are abstracted. Essentially, this is the standard practice exercised in Britain. Definition of these elements and understanding their physical influence on later archaeological phases has questioned the absolute efficiency of this line of enquiry, leading to the application of a less rigid recording format.

Problems with Excavating Waterfront Material

Typically, waterfront deposits are characterised by cycles of deposition and erosion, the effect of which often makes it difficult to define the context fully in plan with any security, especially where spatially cross-referencing across terrain. In order to avoid loss of data or erroneous recording, the preference has been to use multi-context plans initially, and then proceed to a single context planning system as definition of contexts becomes clearer. Even defining contexts within this mode of operation has been difficult to achieve, as a result of three main factors. Firstly, where timber structures consisting of floor boards over joists occur, voids in the floor space are filled by later deposits which are stratigraphically difficult to detect and appear to be therefore earlier than the construction of the timber sills and floorboards. Secondly, later overburden compresses down fragile timber layers into earlier deposits, so that a timber surface can be below the sill beams upon which it originally rested. This compression can be up to 0.30 m (Long 1976, 198). Moreover, when these surfaces are pushed downwards, they often meet earlier immovable objects such as upright posts and can appear to be cut by these posts (Fig.2). The true relationship is only seen later as the archaeological sequence is revealed by excavation. This creates recording problems at the point of excavation, as to the true stratigraphic relationships of these elements and often necessitates major revision when excavation of the deposit has been completed. The effect is that the archaeologically observed terrain has been dramatically modified by natural transforms within the soil after deposition, which thereby, does not physically reflect its original condition or appearance. It is therefore, not a true physical representation of the deposit in the past.

Thirdly, aerobic and morphological conditions of the deposits have changed since deposition. In Trondheim, the land rise has been calculated as being c.3.97 mm per year, or c.4.00 m over a millennia (Christopherson, Cramer and Jones 1989, 7-37). Timbers which in the medieval period may have been waterlogged and standing in water have subsequently become dry deposits and prone to deterioration. Where the timbers have rotted, the space created has been replaced by later fills or surrounding stratigraphy has collapsed into the void. This has created a terminological problem in deciding what these ghosted fills or impressions should be described as. Strictly speaking, these are not fills or cuts, but vertical layers because there is no real cut and therefore there can be no fill. However, these elements have been treated in the conventional sense as fills and cuts as they do correspond to events within the detected archaeological sequence.
Defining the Start of the Archaeological Sequence

The final major definition problem has been recognising what constitutes natural ground. The River Nid was a slow, shallow, mature river characteristically depositing fine, grey silts and orange sands. However, it is subject to seasonal hiatuses due to meltwater and consequent erosion of material upstream which can lead to variable levels of deposition downstream. Organic material such as wood can therefore be sealed within natural river silts. The provenance of such materials remains uncertain. To the excavator this can appear to be primary deposition and interpreted as active use, but in reality there are very strong possibilities that this deposition is residual.

Moreover, the hydrological processes within the river can disperse material. In particular, crushed mussel shell appears to have accumulated as beds beside the river bank but it is probable that this action is the result of natural drift within the river, rather than human action. Geological expertise has become essential in determining what is natural and what is anthropogenically active. The river was shallower in antiquity and a series of eyots or islands lay within it. Adaptation of the river appears to have included retrieving land by infilling between these small bars. The material used was a coarse grain sand with angular pieces of rock. To all intents this looks like naturally lain material. Actually, this is artificially imported moraine material derived from a source 20 km away which could not be transported by natural agencies.

The repercussions are twofold. Firstly, it suggests a sophisticated and systematic programme of infilling and that to execute this programme there must have been pre-existing organisation. This would suggest that rather than nascent economic activity, trade and commerce were already firmly established and that this capital investment in order to reclaim further land was to bolster and maximise this advantage. Secondly, to understand how past peoples adapted and utilised their environment one must have firm evidence of those topographic conditions. This is vital if one is assessing the impact of cause and effect. By losing deposits at the origin of the cultural sequence through lack of archaeological recovery, it is extremely difficult to assess the importance of later elements and to interpret whether these reflect fundamental change or dislocation to the urban environment or merely ongoing adaptations within an inexorable process.

Inter-active Phases

Despite attempting to be as objective as possible, defining contexts and their sequence has been a more subjective exercise than was desirable. However, perhaps this is not as crucial as we normally assume. We may have become over-reliant on the origins of deposits and have paid less respect to how these deposits have influenced and been utilised in later urban landscapes.

The example of timber waterfronts illustrates this well. The Trondheim medieval waterfront recently excavated, had a short life as a quay being replaced by further encroachments into the river within fifty or a hundred years, but the timbers which formed its construction remained in situ. These timbers imposed themselves on the later townscape for up to four hundred years (robbing of the timbers is suggested by 17th century material in the post-pipes) and remained as free-standing structures.

Although primary function for these timbers may have ceased, an important alternative function emerges. An example of this is where ropes have been attached to upright posts in later phases (Fig. 3). Stratigraphically, these ropes lie above silts butting these timber posts, but probably more useful for determining the function and adaptation of the deposits is the fact that the ropes were tied to the posts. This physical relationship tells us that the posts are in active use during a later phase. Using the purely stratigraphic sequence, this important data is not readily available.

Moreover, the physical relationship is a constant reminder that this earlier timber post phase was "inter-active" in later phases and was a vital component in the functions undertaken in those phases. Although, the origin of the timber post phase in the Trondheim example was in the 13th century, perhaps of greater interest was its longevity and influence on the foreshore. This can be ascertained by dating the butting deposits surrounding the posts which have acknowledged physical links, e.g. via the tied ropes. The post phase can then be considered both a 13th century phase due to its origins deduced from the stratigraphic sequence, to in our case at least a 15th century phase, as evidenced by continued function derived from physical relationships.

This has partly been reconciled by employing land-use diagrams apportioning usage over multiple phases and applied to waterfronts (Westman, unpublished). Although a useful tool for overviewing function within the site chronology, it remains an abstract

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Figure 2: Schematic section showing possible stratigraphic anomalies. 1) Later material beneath earlier surface. 2) squeezed deposit appearing to be cut by earlier post. 3) Chosen fills in post-pipe caused by modifications or changes.

Legend:
- Hard gravel
- Soft organic material
- Soft sand
- Clay
- Compaction downward
- Road make up
- Landrise upward
representation of land use and subsequent development, perhaps being a little too deterministic and allowing less scope for multi-functional interpretations.

Dating Phases

The dates of Norwegian waterfront deposits are normally derived from pottery dating, typologies of other cultural material, known historical horizons, dendrochronology and radio-carbon dating. All these techniques have been employed on the Trondheim waterfront in order to provide as wide and independent range of spot dates. These techniques perhaps need a little elaboration in relation to the characteristics of the waterfront. The most accessible dating technique is spot-dating from pottery. The Trondheim waterfront deposits have unearthed numerically significant rather than large assemblages. This is slightly surprising as it is common for waterfront deposits to provide quite high quantities of discarded ceramic material. However, it must be remembered that Norway was an aceramic region until the 17th century when local wares begin production. Pottery which occurs in the earlier archaeological record is all imported and was therefore probably a prestigious product of some rarity, although this cannot be assumed without question.

The likely age of this material at deposition, combined with a low sample, may suggest an earlier date for contexts and thereby phases than is the actual case. Moreover, because much of the waterfront deposit was dumped material, there exists a strong possibility that some if not all of the pottery within the assemblages is residual. It remains uncertain whether this dumped material was rubbish created within individual properties fronting onto the waterfront or waste emanating from elsewhere in the town and perhaps assisting deliberate acts of encroachment (Reed 1990, 22-25). If the material had accrued within individual properties fronting onto the river, then this would be highly suggestive of a date for occupation of these properties, possibly their status and the use or adaptation of the waterfront. If it came from elsewhere in the town, it still could be contemporary to the waterfront but its dating security is less certain because it may reflect the systematic removal and then dumping of one act of rubbish accumulated over many years (Reed 1990, 27).

Looking at other cultural material may answer this paradox and place the pottery within a broader contextual framework. The waterfront deposits provided a very large quantity of leather shoes and to a lesser degree bone combs and bone wasters. The leather artefacts being organic material would certainly survive poorly in aerobic conditions that would associate if these deposits had originally accrued on higher ground elsewhere in the town.

The leather shoes displayed fine preservation and it appears highly likely that they did not emanate from elsewhere in the town. As the pottery was found in association with the leather shoes it would seem probable that the pottery was almost contemporary to the waterfront. Typologies of leather shoes and bone combs are being developed in Norway but this research is hampered by a lack of material data to cross-reference, difficulties in establishing security of context, an interest in the intrinsic rather than the holistic, lack of access to work undertaken elsewhere and the format of project funding and research.

At present, there exists too much latitude in these typologies to provide accurate spot-dating for contexts. Also, there are difficulties in assessing the significance of subtle stylistic changes and judging whether these are wholesale or gradual developments (Larsen 1992, 11-15). However, because we have excavated the complete archaeological record over a wide area of the waterfront, the data exists for future research within a relative site specific chronology. This line of enquiry will hopefully produce encouraging results and the typologies required.

Trondheim, being a town constructed almost entirely from wood, has during its history been subject to many conflagrations. These fires were particularly serious in 1328, 1344, 1481, 1531, 1598, 1651, 1681 and 1708 (Long 1976, 184-185). In places, burnt timbers and scorched material have been found along the waterfront but only the 1681 historical horizon has been isolated with any certainty. The poor definition of these horizons is due to clearance of burnt debris and salvage of timbers shortly after these fires, the confines of the areas excavated and the uncertainty within historical documents as to the extent of these fires within the town. Only the 1681 Fire can provide a terminus post quem for the underlying deposits along the waterfront.

Dendrochronology has been widely employed in Norwegian archaeology to determine phases. Along the waterfront, the anaerobic conditions have preserved the sapwood of the timbers making possible multiple interpretations of these timbers. Although no results have been received yet, it should be possible to identify whether the timbers are all of one phase or
Figure 3: A post represented in 'inter-active' phases. 1) The post as a revetment. 2) A mooring post. 3) Consolidation of the post. 4) A mooring post. 5) A mooring post. 6) A platform or building.
multiple phases, identify replacement timbers within a
main grouping, determine the season of felling and
possibly even estimate the provenance of the timbers
(Eckstein 1984, 25-26). This information may enable
the production of a close range of dates for the timbers
which, in association with the pottery evidence, can
assist in the compilation of tighter chronologies for
other cultural material. However, dendrochronological
techniques may have limited applications with the
Trondheim waterfront because coniferous trees such as
fir or pine are not as sensitive to seasonal climatic
changes as hard or deciduous woods (Long 1976,
198).

Finally, a limited amount of Radiocarbon samples
have been taken from the waterfront. This analysis has
been undertaken to assess the organic conditions of
this area prior to the introduction of formal waterfronts
(Mook and Waterbolk 1985, 44-45).

The formal waterfronts appear to reflect changes in
technology and shipping practices which required
deeper draughts for vessels (Jondell 1985, 127).
However, strong indications exist that a maritime
function was served in this vicinity prior to the
establishment of these waterfronts (Christopherson
1991, 164-165). The evidence consists of occasional
timbers from undatable contexts and layers of crushed
shell. Preliminary Radiocarbon results do suggest a
continuity of function typified by landing hards rather
than formal timber waterfront constructions. This
relative chronology suggests that this function was
practised at least two centuries before the introduction
of a formal waterfront. An absolute chronology based
on comparative stratigraphy cannot easily provide this
important information as to the origins of the
waterfront.

Conclusions

This paper has attempted to highlight some of the
problems encountered in excavating waterfront
deposits. Some of these difficulties are typical of this
form of archaeology anywhere, whilst some are unique
to the natural processes and environment found in
Norway. The key areas that I have attempted to raise
are:

1. Definition of contexts, whether contextual "event"
archaeology is the most satisfactory method in
determining long-term deposition.

2. Recording problems with partially standing
structures and respecting deposits.

3. How these structures effect the later urban
landscape and impose themselves, despite loss of
primary function.

4. Difficulties in dating these phases, calibrating
material and producing absolute chronologies.

Resolution of these problems is not readily at hand,
especially if we take a rigid view of what constitutes
an event in the past be it a context, the date of an
artefact or a known historical horizon. However, we
are bound by this chronological structure if we are to
understand relative changes and therein those
dynamics which effected past societies. The lesson
learnt from the excavation of Trondheim's waterfront
thus far, appears to be that a flexible and open-minded
approach to understanding the formation of waterfront
deposits will reap the greatest reward.

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