Application of dendrochronology in archaeology. Water and sewage systems in Renaissance Vilnius

Rūtilė Pukienė

Vytautas Magnus University; National Museum the Palace of the Grand Dukes of Lithuania Ž.E. Žilibero St. 6, LT-46324 Kaunas, Lithuania; r.pukiene@gmf.vdu.lt

Dendrochronology is a powerful tool not only for investigation of current processes in living trees or ecosystems but also for studies into social history. Since wood for the long time has been one of the main resources used by people for different applications (constructions, furniture, boats and carriages, utensils, artworks, etc.), extant wooden artefacts contain chronological tree-ring information that may be used both for environmental sciences and for dating social events.

A number of wooden underground objects had remained in the Vilnius Lower Castle territory from different periods due to the high groundwater level: remnants of wooden houses, pavements, wooden supports under masonry buildings, posts, etc. During archaeological investigation of the Castle elements of wooden water supply system and sewers were also found.

Two types of finds were discovered during archaeological excavations in 1987–2009 that were related to the underground water-supply network. They were wooden water pipes and their remains, as well as the metal couplings used to join them. The diameter of the pipes made from pine logs ranged from 25 to 40 centimeters and their length measured 9 meters. The pipes were joined to one another using iron cylinder-shaped couplings with diameters of 11 to 17 centimeters and length of 10 to 13 centimeters.

The earliest remaining wooden water pipes found in the Lower Castle were dendrochronologically dated to 1529. This first pipeline supplied with water the newly built grand duke's palace. In the 1540s–1550s major development of the water-supply system in the Vilnius Lower Castle occurred. Pipes were dated to 1545, 1551 and 1558. Water supply system was gravitational. Water flowed down from springs in hills over the Vilnius city wall.

In 2002 and 2008 also parts of a wooden sewer were discovered north of the grand duke's palace. The sewer was meant for kitchen waste and was assembled in sections. Each section consisted of a flume made up of four sawn longitudinal boards resting upon cut out sections of log mudsills and covered by transversal boards. There were triangular rafting holes in some of mudsills. The covers of the sewer were mainly made from oak and the rest parts – from pine timber. An 83 year-long oak tree-ring series was dated to 1530 against English oak chronology of the Baltic origin BALTIC1. After investigation of pine elements a 248 year-long tree-ring series was made and dated against Vilnius pine chronology to 1539. The pine mudsills were preserved up to the bark edge.

By the dendrochronological investigation of the remnants of water supply and sewage systems a rapid development of modern conveniences in Renaissance Vilnius in the 16th century was traced.