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Wooden objects in museums: Managing biodeterioration situation

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ABSTRACT

In this article we discuss the situation concerning biodeterioration in museums. For example we consider the collections of the Estonian National Museum (ENM). The Estonian National Museum in Tartu is a national museum charged with responsibility for, amongst other things, the preservation of a great number of wooden objects. Wood is represented in the ENM collections in furniture, working tools, household utensils, basketry etc. To study the condition and damaging factors of wooden objects, a collections survey was performed. Many wooden objects in the EMN collections have been found to suffer from varying degrees of insect and fungal deterioration. The biodeterioration of objects provides information about their previous environmental conditions and the use patterns of these objects. The actual biodeterioration situation in the storerooms of the ENM is continuously monitored and managed. The risk of biodeterioration of wooden objects is small but nevertheless present. The need for integrated pest management supported by well-managed information is important in collecting institutions.

1. Introduction

Museums are institutions which acquire, conserve, research, communicate and exhibit the tangible and intangible heritage of humanity and its environment for the purposes of education, study, and enjoyment (ICOM Statutes, 2007). The cultural heritage preserved in museums is always present in the form of some artefacts, which can be both of inorganic (stone, metal, ceramic etc) and of organic origin (wood, leather, textile, paper etc). Objects that are preserved in museums are often damaged in various ways. The damage is caused by deterioration processes taking place in materials. Such processes are divided into physical, chemical, mechanical and biological processes (Kronkright, 1997). The deterioration processes themselves are natural, but the assessment of changes that have occurred in the objects and their result (whether an object has been deteriorated, whether it should be conserved etc.) is dependent on the social context and the values that are adopted in the given culture (Ashley-Smith, 1999).

Biological deterioration processes take place as a result of vital functions of different organisms (bacteria, actinobacteria, fungi, insects, rodents etc), and their direct effect on objects is mostly either chemical or mechanical. Biodeterioration is a complex phenomenon that occurs in conjunction with other causes of decay. On the other hand, it is always very closely connected with the environmental, technological, and social factors (Fig. 1) (Konsa et al., 2004). Main organisms which cause biodeterioration of wooden heritage objects are fungi, insects and rodents (Unger et al., 2001).

There are two main aspects of biodeterioration situation in museums (Fig. 2). First, objects from different time periods and geographic regions often have previous damage. The extent and nature of deterioration also depends on the criteria that have been proceeded from when collecting the objects into museums. As both insect and fungal deterioration are dependent on environmental conditions, their occurrence can provide information about the previous conservation conditions of the objects. An integral assessment of the biodeterioration situation in museums includes both the current situation in the museum storerooms, possible biodeterioration in progress and also previous biodeterioration of objects.

Second, actual biodeterioration situation in museum. Biodeterioration is quite common in museums (Merritt and Reilly, 2011). The main reason for it is the formation of environmental conditions that are suitable for the organisms, either due to building problems, malfunctioning of HVAC (heating, ventilation, and air conditioning), or accidents. The aim of museums is to preserve the collected objects for as long as possible. The value of the preserved objects is first and foremost research value, and they are considered to be sources of documented information about the past. This means that

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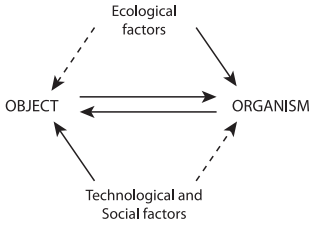

Fig. 1. Situation of biodeterioration. Arrows indicate the main influences and dashed arrows secondary influences.

objects should be preserved in their original state as much as possible, which sets strict limits on the treatment of objects. Successful pest management in museums requires integrated pest management (IPM), which is based on an ecosystemic approach (Pinniger, 2004; Brokerhof et al., 2007a,b; Winsor et al., 2011). IPM uses information on all aspects of the biodeterioration situation. The need for integrated and collaborative pest management supported by well-managed information is important in collecting institutions. Biodeterioration management strategies should be viewed within the context of the whole preservation system of a collecting institution.

This article attempts to provide a consistent overview of the biodeterioration of wooden objects preserved in museums, the environmental conditions, the treatment of objects, and the information that can be gained when examining damaged objects. Our case study involves the wooden object collections from the Estonian National Museum (ENM).

1.1. Estonian National Museum at Tartu

Estonian National Museum is an ethnological cultural history museum with the aim of reflecting everyday life and culture as a way of living, taking into consideration its temporal, spatial, and social diversity. The museum concentrates on the Estonian culture and also on other Finno-Ugric nations, especially nearby Baltic-Finnic small nations. The museum was founded in 1909 in Tartu. In 1922 the museum moved to Raadi, near Tartu in the former manor building of the Liphart family. In 1923 the first permanent exhibition was opened there. In 1944 the Raadi manor building was damaged in fire and the area remained in the possession of the Soviet army until Estonia regained its independence. The museum was moved into a former court building in Veski Street where it is presently located. The museum collections were stored in different buildings in Tartu; the storerooms were located e.g. in St. Paul's church in Riia street and St Alexander's church in Sõbra street. In 2000 the construction works of a storage complex in Raadi was started; these were completed in 2004. In 2005 an international architecture competition was announced to design the new main building for the ENM. The new building situated in Raadi should be ready in 2016.

There are over a million preserved objects in the Estonian National Museum; these are divided into different collections, both based on the content and the type of the objects. By content, the preserved objects are divided into the following subcollections: A – Estonia and Estonians; B – Finno-Ugric nations; C – other nations; D – cultural historic collection; K – art collection. The archive where different documents are preserved is divided into a manuscript archive, a collection of drawings, and the archives of the ENM as an institution. In addition, there are also a photo collection, a library, a record library, and a video archive.

2. Materials and methods

2.1. Examined wooden objects

The wooden objects are an important part of the ENM's collections and depending on their origin, classified as belonging into its different subcollections (see 1.1). In this article we discuss only wooden objects and give examples of items of furniture and ethnographic objects. The surveyed items of furniture include for example chairs, beds, cupboards, and ethnographic items. The chairs were divided into two groups: first, farmhouse chairs mostly from rural areas, and, second, chairs with soft upholstery from manors and town flats. Beds and ethnographic items are also mostly from rural areas; the cupboards, on the other hand, exemplify town furniture. Ethnographic items also include items used on farms such as barrels, vats, butter molds, milking barrels etc.

The examined objects were chosen proceeding from both different conservation conditions in museums (different storerooms) and also from different previous origins (farm households, manors and town flats). In this article, the number of objects under discussion and their placement into repositories is shown on Table 2 (see 3.2). The objects are made both from hardwood and softwood; the most frequent types of wood are pine, linden, spruce, alder, and birch. Other materials have also been used in preparing the wooden objects: metal, textile, and finishing agents. These might contribute to the biodeterioration of wood, prevent such deterioration, or have no impact on it. Also, these materials can be damaged by biodeteriorating agents.

2.2. Environmental conditions in storerooms

Environmental conditions (temperature and relative humidity) have been monitored in the storerooms since 1998. As there were few loggers back then, the data from this period is incomplete. The only information about earlier environmental conditions is based on the recollections of the museum staff. Starting from 2008, all storerooms in Raadi are equipped with stationary data loggers. From 2008 to 2011, HOBO 8 Temperature/Relative Humidity data

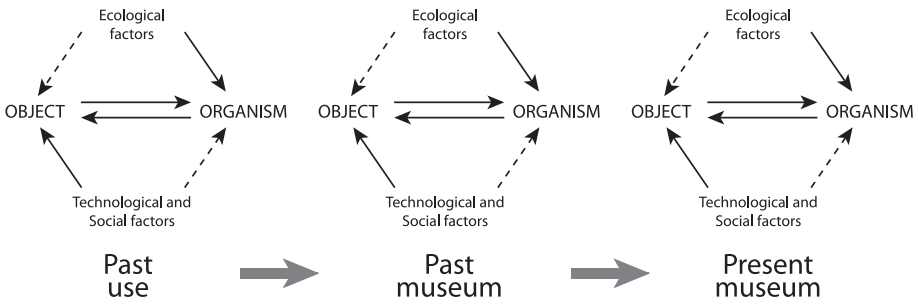

Fig. 2. The main stages of long-term biodeterioration of museum objects.