Problems of the Biodegradation of the Cultural Heritage in Latvia

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In the present report, I will focus mainly on biodegradation problems in large cultural historical objects - buildings, not touching upon the preservation of museum funds' articles.

The cultural heritage - buildings can be conventionally divided into the four large groups:

1. The Jugendstil (*Art Nouveau*) buildings (mainly in Riga),
2. castles, estates (more than 140 objects in the whole Latvia), churches,
3. dwelling houses of cultural historical importance (in Riga - Mezaparks, Kipsala, Pardaugava, wooden buildings in Jurmala and Kuldiga, etc.),
4. Open-air museums (Open-air museums in Riga and districts).

The major part of cultural historical buildings more than 50 years, even up to the 1990s, had been the property of the state and the local self-governments. The funds spent for their maintenance were very restricted, although some objects were granted the status of an architectural monument. In fact, these were ownerless houses, where, at best, minor repair was performed. In this period, valuable buildings were lost. Ethnographic museums were in better situation, although, even there, much depended on the employees' enthusiasm and experience.

The 1990s were marked with the following:

1. the property forms changed,
2. the state financing for culture, including museum management, became more scanty.

The former owners were provided an opportunity to get back the property, and well-to-do people - to purchase it.

The major part of these objects in an equally poor condition - roofs, water drain-pipes, hygiene equipment, etc. has not been repaired for tens of years.

The fact, how this cultural heritage looks like now, depends mainly on the new owner's financial possibilities and understanding of the building's value.

The cultural historical heritage is currently characterised by several tendencies:

1. <u>The property is acquired by owners with financial resources, who begin managing it:</u>
   a) There are buildings in which private owners have performed an assessment and a high-quality restoration, retaining the interior, which is not the less important constituent of the heritage;
   b) the property is arranged by the state and further managed by firms, profiting thereby. Some objects are qualitatively restored for European funds.
   c) For some Jugendstil buildings, the facade is restored perfectly, but the inner premises are completely re-built, to meet the requirements of office premises and class-rooms, which is actually a demerit of the cultural monument.

2. The owners perform only minor repair works or, when repairing, do not perform the appropriate assessment of damages:

   a) The overhaul was not performed in the majority of buildings, obviously, because of the owners' restricted financial possibilities. For example, to warm the premise, the original wooden windows are replaced by plastic ones, which makes the appearance even more deplorable.

   b) building's owners, when repairing their buildings, very often rely on the builders' professional experience relative to the assessment of the dangerousness and volume of biological damages. Unfortunately, our experience shows that this professionalism is not always at a sufficiently high level. If fresh insects' or active fungal (especially the true domestic fungus *Serpula lacrymans*) damages are not observed, then, already in 1-2 years, the repair work will be set to again, thereby destroying the recently performed construction results.

For example, in the building of the railway station in city Liepaja constructed in the late 19th century, the builders did not observe the true domestic fungus in the exterior wall, where it developed because of the non-repaired roof drain-pipe. As a result, within 2 years, the fungus had completely destroyed the new window frames, including the glass wool insulation layer and the floor below the linoleum (our experience shows that linoleum is not a good covering material for wooden floor. Beautiful mycelium were formed along the floor laths and on window sills.

Another example from the building in Mezaparks district in Riga - the builders did not observe *Serpula* in the wall, which developed rapidly below the covered flooring, and repeated substantial repair was necessary in a year.

Sometimes the problem in Latvia is the incorrect use of thermal and moisture insulation materials. During the repair, wood constructions that are not sufficiently dried or are moistened owing to water condensation fail to dry, since they are covered with these insulations materials. Thereby, a very favourable medium is created for the formation of mould, and then rot fungi. However, also in this case, wood degradation will not be dramatic, although the environment pollution with mould spores will not be less unpleasant.

3. The owners, for financial or other reasons, do not carry out any activities at all. "Other reasons" could be connected with the cultural monument's status of a building, which imposes known limitations and obligations; at the same time, the state does not grant any privileges to this building's owner.

   a) A part of these buildings stands without roofs for years and is degrading gradually.

   b) In a similar way, the owners let the buildings be ruined also in Jurmala, where there is a unique building system, which, however, does not satisfy the well-to-do people, who want prestigious houses in the old cultural historical building zone. If the owners lack the patience to wait for the results of the biological degrading agents' activity that lasts, however, for several years, then these bothering cultural monuments often burn down "by accident".

   c) Because of the shortage of financial resources, the part of the cultural heritage that has been passed over to the control of self-governments is lost in part. For example Svente's estate, there was a school in this building, and even 6 years ago, when this school was moved to a new premise, it was in a stable condition. Now, it looks sadly, and not only the self-government that is guilty in this case, but also the local inhabitants who indifferently watched the building to demolish. The widely spread true domestic fungi that have developed because of the damage of the roof ceiling indicate that nothing can be restored there.

4. The buildings in open-air museums are in a comparatively better condition. For example, in the Ethnographical Open-Air Museum of Latvia, about ten years after the 1950s, the treatment of the buildings erected there was performed by impregnating them in baths with wood preservatives, mostly fluorine and boron compounds, so that to prevent the change of the natural color of wood. In buildings erected in the Museum in the 1920s and 1930s, preservation was performed by introducing cartridges with salts into the beams. In the 1950s - 1960s, serum candles used to be burnt in the premises to combat insects.

The true domestic fungus was not found in the Museum's buildings, other fungal damages are local, and these are controlled, particularly damaged parts being taken away and replacing them with treated wood prostheses, which are later shaded.

The major problem is the damages caused by wood borers, the most widely spread being Long Horn beetle (*Hylotrupes bajulus*), Common Furniture beetle (*Anobium punctatum*) and Death Watch beetle (*Xestobium rufovillosum*).. There is no equipment in Latvia for combating of wood borers by thermal treatment, therefore, attempts have been made to control the spread of the insect with surface treatments, although it is not possible to achieve a prompt control of the insect thereby.

However, to ensure that these open-air museums would stand for another tens of years (the Etnographical Open-air Museum of Latvia is 75 years old now, and it is one of the oldest in Europe), considerably larger state financing is necessary, for example, to acquire this movable thermal treatment equipment to secure the fire-resistance of the Museum, which requires the extension of the staff (watchmen).

Our Laboratory has been engaged in the investigation of wood biodegradation and protection problems for more than 40 years, although the demand for identification of biodegradation agents in buildings has emerged only in the last ten years. This is, undoubtedly, connected with the comparatively intensive restoration of valuable buildings - cultural monuments. The Laboratory's staff has trained in material research centres of Germany, Sweden and Norway to master the methods for identification of biodegradation agents - fungi and insects. We perform the expertise, identify the biodegradation agents and consult on the appropriate methods for their control. Annually (practically, in the warm season), 30 - 40 expert examinations are performed, and around 100 interested persons is consulted on the problem. To make it possible to recommend the most appropriate protection agents for control of biodegrading agents, we follow the recommendations of the leading producers of wood preservatives, such as Remmers.

Carrying out the objects' examination, systematizing the reasons for the development of biodegradation agents and evaluating their spreading, we have ascertained the following:

1. The most dramatic damage to cultural monuments in Latvia is caused by the true domestic fungus *Serpula lacrymans*. Another most frequently encountered fungus is the cellar fungus, or *Coniophora puteana*, followed by the white pore fungus *Poria vailanttii*. In bulky wooden parts, if they were subjected to the action of moisture, gets there through the cracks and develops intensively.
2. Among powder-post beetles, the most widely spread are especially furniture beetles (*Anobium punctatum*) and long horn borer (*Hylotrupes bajulus*). Most often, the beetles damage wooden parts in churches, wooden log houses of beams and window-sills. Long horn borer is found most often in beam log houses. More rarely, carpenter ants damages are found - they commonly form nests in log houses, using for this purpose the fungus-degraded lower crown log wood.

The true domestic fungus is the most dangerous wood degrading agent. The information gathered on its spreading testifies that this fungus is found in all Latvia's regions, and, for the time being, the plausible evidence confirming that develops most often in Latvia's seaboard is lacking.

The major reason for the development of *Serpula* is the regularly high moisture content in wood, caused by the following reasons:

1. worn out roof coverings and damaged drain-pipes,
2. damaged hygiene equipment and water gutters,
3. the wood that was not adequately dried after flooding and fires,
4. regular moistening of wood from high ground waters, owing to the absorption of rain water or moisture diffusion from the damaged moisture insulation,
5. formation of condensation moisture owing to poor thermal vapour insulation,
6. moisture-impermeable insulating materials,
7. changes in the building's microclimate, when building in a bath, laying linoleum, installing water-supply, etc.
8. inadequately built-in flooring (without ventilation),
9. insufficiently insulated moist premises (bath-rooms, kitchens),
10. insufficient wood protection (incorrectly chosen means, insufficiently introduced or applied amounts of a wood preservative).

Serpula is found most often:

- in cellars, under the floor, in chimneys.

In Latvia, the registration of the cultural heritage is managed by Cultural monuments protection organizations, which compile and revise the lists of cultural monuments, preventing their destruction or reconstruction to an inadmissble extent. However, nobody is responsible at the state level, if these objects are destroyed because of the lack of financial resources. Then they are simply deleted from the monuments list.

CONCLUSIONS

We cannot affect the state policy, achieving the allocation of money to ownerless cultural monuments. What we can only do participating in the preservation of the cultural heritage is:

1. to educate the society on biological damages, their dangerousness and adequate methods for control,
2. to collaborate more closely with builders, performing the examination of building damages and the timely identification of the degradation agents,
3. to look for collaboration partners and resources, for the exchange with information and looking for the solution of these problems.