

## THE STUDY OF CONSERVATION STATE OF A WOODEN CHURCH FROM BOZ VILLAGE, HUNEDOARA COUNTY, ROMANIA

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### *Abstract*

*The study presents the conservation state of the wooden churches from Hunedoara County, Mureş Valley, Boz village. This is an example of the rich patrimony of this area. The problems encountered at Boz church are the effects of different causes, including those with major impact: biological degradation and deterioration, human intervention and humidity effects. After analysing the state of conservation of this monument, we specified the interventions that need to be done at the building's components, emphasizing especially the emergency measures that cannot wait. In order to save this monument, which is a representative one for the wooden architecture of this area, it is necessary to implement the scientific project and to establish certain specialized committees and teams, whose goal should be to save the entire monument, not only parts of it – as it has been done so far at this church and at almost at all the studied churches.*

**Keywords:** *conservation state; wooden church; interventions; interior paint.*

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### **Introduction**

Boz village, a fairly well developed one, lies on Bozului Valley, on the right side of the Mureş Valley. The church is still in use (at the important holidays over the year) and is listed on the monument list in national B class (HD-II-m-B-03261 [1]). It is roughly located in the centre of the village, inside a spacious orchard. The wooden church was built in 1701 – this date was recorded on a lost inscription which was written afterwards with Arabic characters on the back of iconostasis [2], during the priest Oprean II's activity [3]. The church is mentioned in old registry books [3] and on Josephine's map from 1769-1773 [4].

The most comprehensive study on this church belongs to Ioana Cristache Panait [2], followed by Florin Dobrei [3], but the study wasn't complete, and so a new research on this field was necessary, for updating, reanalysing the monument and presenting its conservation state. Recently the church from Boz village was the object of a study for interdisciplinary teams who have elaborated detailed analytical cards of many wooden churches in this area [5], but unfortunately we encountered omissions and some deviations from reality, that must be completed.

The wooden church from Boz has a rectangular form, with a polygonal altar uncrossed, with five sides. Later, on the West side, a rectangular porch was built.

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Over the narthex with a ceiling were built a bell tower. The nave has a semicircular arch which is resting on a decorated cornice with retirement profiles. The arch is consolidated by a transversal median arch. The altar arch is formed by a narrow semi-cylindrical part on the West side, from which three taper fascias start off to the three sides of the altar.

The wood is one of the oldest materials used in constructions and decorations, and it also was a material widely used in this area of the country [6]. The wood is very efficient in bending applications and can be designed for either tension or compression stresses [7]. The material for the construction of Boz wooden church is made of different essences of wood, mostly oak, durmast (at sill, walls, roof and bell tower construction, old frame of the door), fir and spruce (at ceiling, arch, shingle, interior objects, door, frame, revetment). Due to its excellent mechanical properties and high durability, oak is one of the preferred timbers for construction purposes [8]. So the walls of old church from Boz are made of oak beams, using the Blokbau system, where the beams are horizontally placed one over the other and jointed in dovetail corner [9] and at consoles the beams are half jointed. During another intervention (the construction of a new narthex, the amplification of church) the people used the half-lap and joggle joints [9, 10].

Outside the basement is included and doubled with concrete. The sills, walls and consoles are plastered with lime and sand over cane cladding. The retreating consoles have a little lobe at the bottom. The roof height is almost two times higher than the walls. This was covered with handmade shingles from spruce, fixed in tow layers and laterally jointed (in tongue and groove). The high bell tower has a turret on consoles with a closed gallery, with splay roof covered with shingles (Fig. 1.).



**Fig. 1.** The wooden church from Boz Village

The interior of the wooden church, except for the porch, is entirely painted. The painter grounded the wood and interstitial canvas before painting in tempera technique. Facial features, the accuracy and precision of the drawing, as well as the proportions demonstrate the skill and especial artistic talent of the painter. The interior painting possibly dates at the end of the 18<sup>th</sup> century and the beginning of the 19<sup>th</sup> century [5].

In the narthex may be found only traces of ground and colour on the walls and fragments from the decoration of the ceiling (Fig. 2a). Inside the nave we can admire a symmetric

painting, organized on registers, but it is difficult to recognize the scenes and the saints, because of their highly degraded and deteriorated state. The icon support inside the nave is remarkable since it was painted in the same period with the walls and represented Saint Simeon Stâlplnicul (Fig. 2b).

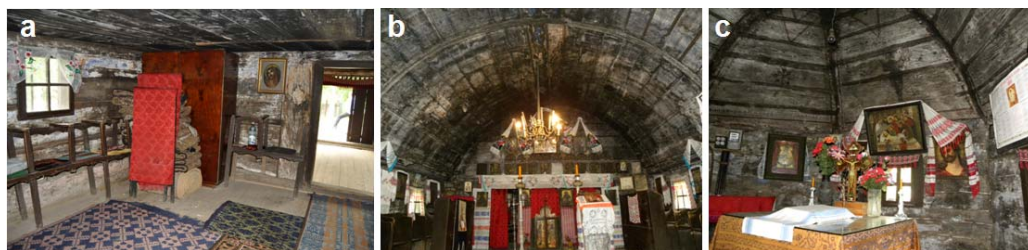


Fig. 2. Interior of the church – a) Narthex, b) Nave, c) Altar

The iconostasis is painted and above the royal doors there is a register with icons representing the important moments of Jesus' life. Off the doors are the imperial icons dating from 1804. The imperial doors date from 1895 (Fig. 2b).

In the altar, the paintings on the walls are highly deteriorated and few saints may be identified, while the symbolic representations on the arch are better preserved (Fig. 2c). In the church are also preserved some icons on wood dating from the 20<sup>th</sup> century and icons on glass.

## Methods

For the analysis of Boz wooden church and its conservation state were made researches through the historical sources of the State Archive, Hunedoara County and of Transylvanian Romanian Orthodox Metropolitan Archive from Sibiu. Other information is taken from documents stored in churches and from many published studies. The research program included many views of the monument, planimetric measurements, wood humidity registrations (using a Basetech BT-300 humidometer), photographing and studding in situ of the monument, of component elements, of wood species and of interior spaces and objects. We made macroscopic-photos of the painting layers (using a portable Dino Capture microscope) and observations of repainted icons in direct, indirect and UV light. Wood species and biodeterioration analysis was made through our observations and compared with values of wood humidity, old picture and picture during our research [11-14]. We watched the progression of deteriorations recorded in our documentation (in situ drafts and photos), observing the evolutions from 2009 to 2012.

## Results and discussion

Our comments relate primarily to the changes in the monument along time, the stages of construction and decoration, the conservation state and emergency intervention necessary for the wooden church from Boz village, Hunedoara County.

This wooden church was enlarged to the western part. At the northern wall was fixed a vertical pillar and on the south side, tow pillars (one corresponding to the Northern part – in the middle of nave and the second one to the western one). Horizontal beams are jointed on these pillars by tongue and groove joints (this technique was used for the extension of the walls, because the length of the beams was not enough). In the narthex we may observe the extension of the wall, because the old dovetail joint was preserved here (on the west wall of the church)

and the new wall was jointed to it (Fig. 3.). This extension was made before painting the interior spaces.

Afterwards, the exterior walls were plastered in 1872, this date being recorded on the stucco decoration from the west wall. The porch was made after this moment, because we can observe the alignment of the porch pillars on the same level with the plaster of the wall (the pillars are not included in plaster).



**Fig. 3.** Old joint, from where was enlarged the North wall of narthex

Deterioration and degradation of wooden monuments have been caused by many factors acting individually or together, but the time of their action is decisive. The main groups of agents that contribute to the imminent deterioration of component materials (various wood essences, woven fabric, adhesives, pigments, etc) are: humidity, temperature, light, atmospheric ozone content, pollution, natural disasters, human influence (fire, previous inadequate interventions, vandalism, theft, property damage as a result of wars, uprisings, landscape degradation), biological agents (bacteria, green algae, fungus, lichens, mosses, insects, birds, bats, rodents), vegetation and, finally, the kind of wood (softwood or hardwood) [15].

This process is hard to overcome, but slowing it down can offer a longer life for the monument. Among the agents of biodegradation the biggest impact is made by fungus and insects (beetles). The three first sources of wood degradation are fungi (rot or decay), insects and weathering [16]. The surface of the wood can be degraded if the wood repeatedly becomes wet and dry, is exposed to high and low temperatures and is exposed to direct sunlight. This degradation causes roughening of the surface, checking, splitting and wood cell erosion. Erosion, caused by the loss of wood cells from the lumber surface, is a slow process [16].



Apathetic and ignorance are also causes of degradation of these churches. We have met in this church this phenomena, where cleanliness wasn't maintained, on the walls were excessively exposed paper icons with glass, without any value, towels, rugs, decorations, etc - the villagers rejecting the directives to remove them, but in present the painting is partly discovered (the ceremonial flags are on the walls causing the scratches, thinning and losses of the painting; few of the icons and towels still remain on the walls).

The villagers chose to build a new church in the proximity of the old wooden church. In these situations, the maintenance of the old monument is the solution to conserve it for future generations, to respect its authenticity, identity and integrity.

Unfortunately this church is in an advanced state of degradation and deterioration, and all delay of interventions is injurious to this valuable monument.

The main cause for this deteriorations and degradations is the losses of tightness of shingles cover. The roof suffered biodegradation and mechanic damages (Fig. 4.). The shingles, exposed to weathering and direct sun light were degraded, and cannot provide protection to the monument, if they are not changed in time, in 30 – 40 years [17]. We noticed the existence of lichens and fungi over the whole surface of shingles cover, especially on the north side, at the base of the bell tower, at the intersection of the porch with the narthex roof and at the level of changing of the tower roof's inclination.

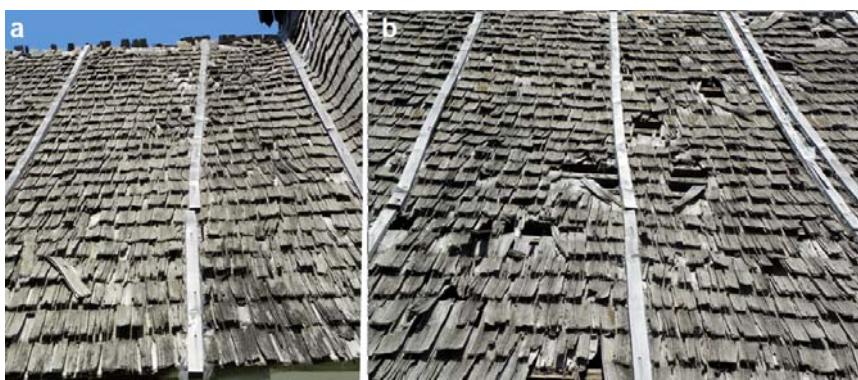


Fig. 4. Damages at shingle roof from 2011: a - North side, b - South side

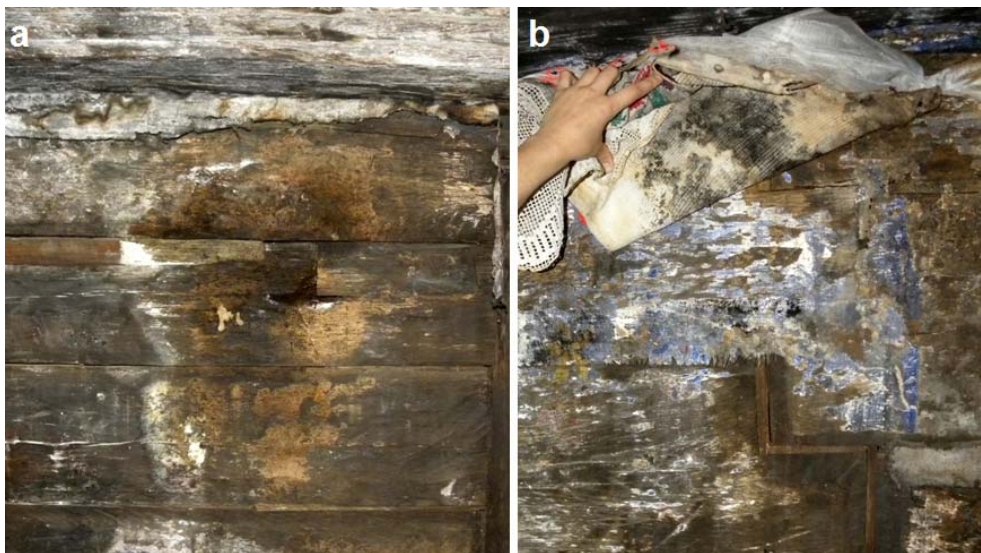
Infiltrations contributed in most of the cases at the degradation of the entire monument, while the humidity of the wood increased. We recorded the approximation humidity of the wood from the interior wall beams, whose average is presented in the next table.

Table 1. Average of wood humidity of the wall beams (recorded inside the church)

Cardinal Point / Location	North narthex nave	South narthex nave	West narthex	East Altar	South altar	South East altar	North East altar	North Altar
Lower part	16%	16%	15%	15%	18%	15%	20%	15%
Median part	15%	22%	13%	14%	14%	15%	15%	15%
Upper part	15%	19%	14%	14%	12%	14%	15%	14%

We can observe from these averages that the humidity from the infiltration and upward water are present inside the monument especially in the covered areas, where the low ventilation cannot dry it enough. Where the humidity was bigger than 14%, we found fungi attack under covered areas (Fig. 5a). Where the humidity was bigger than 18%, we found rot (Fig. 5b).

Advanced attacks of *Anobium punctatum* are very frequent at boarded floors, ceilings, arches, furniture and elements of iconostas all over the church. At wooden churches they appear also on the painted walls and they prefer the areas under the interstitial cloths with glue residues [18]. We observed at Boz wooden church an active attack of beetles, *Anobium Punctatum* at the boards' floor (which is partially covered with carpets) (Fig. 6.). The oak wood present fewer insects attacks than the fir boards (this attack is also active).



**Fig. 5.** Biodegradation of beams: a - North wall in narthex, under a towel, b - South wall in nave, under an icon



**Fig. 6.** – *Anobium punctatum* attack on boards' floor

Inadequate interventions have accelerated the degradation processes. For example the good intention of DALA foundation and Architects' Chamber of Romania for saving lots of wooden churches (including this church in a big project), not always lead to positive results. In

this case of church from Boz, because many problems appeared, a private firm was made a lot of mistakes from own initiative. So, they have made recourse to a method which accelerated the damage instead of slowing down the process. The covering of the roof with polyethylene foil was approved in 2009 (normally they should have used impermeable canvas for this temporary measure). During this action a considerable part of the shingles was destroyed by the workers (Fig. 4b). So, one year later, the polyethylene foil was quickly destroyed, and the church roof had more problems than it had had before the intervention. This was a big problem for the entire monument (walls, plaster, sills, basement, boards floor), especially for interior painting. During this year, the villagers, under the priest's coordination, have covered the nave and half of the altar with impermeable canvas (in this case the covering action was executed correctly through dragging the canvas and no one had to climb up on the roof), but the painting is still unprotected and unpreserved.

Another inadequate intervention is the consolidation and doubling of old basement with concrete, favouring the capillary ascension of the water upwards to the wood.

Wanting to decorate the interior space (which had a deteriorated painting) the villagers exposed a lot of paper icons with wood frame and glass, without any value, towels, rugs, decorations, all fixed with iron nails. These have accentuated the process of the water condensation and the acceleration of the biodegradation. In 2012 most of these decorations have been removed and the iron nails were empirically extracted by the villagers. The church is not protected by fire and transgressors.

The interior paint is in an advanced state of degradation and deterioration, with considerable losses. All painting layers have washed part and dirt stains on preserved painting. On the narthex ceiling, on the nave and altar arches, on all walls there is moisture halos and stains, washing, losses, flaking, cracks, breakings out, attenuation and very fragile paint layers of a considerable surfaces, the main cause being the infiltrations (Fig. 7.). The most exposed parts are the upper areas of the walls and the bases of the arches (Fig. 7b). Another major cause with negative influence on the paintings is the insufficient ventilation of the entire space.

The entire painting is covered with smoke, dust, dirt, spider cloths, deposits of plants and insects scraps, sand, etc. Most of the interstitial canvases are lost. Those that have been preserved are fragile, rigid and present rot, breakings and rags.



Fig. 7. Degradation of paintings layers and interstitial canvases: a - Narthex, b - nave, c - altar



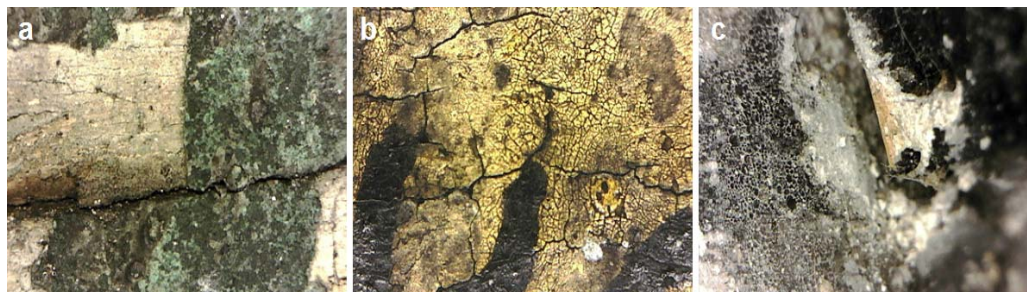
The painting is tragically, scraped, functional used, worn in the areas exposed to ceremonial flags and people level. The most exposed part is the western wall of the nave and the neighbouring areas on the arch, choirs, banks and doors areas.

The inadequate interventions on the painting were also done by fixing the wood boards and interstitial canvases with iron nails, the brutal cleaning of the interior, the removing of dropped interstitial canvases, the cleaning of spider cloths and the removing and replacing of towels. During the works at the roof structure and/or roof shingles cover new losses of the interior painting were produced. The painting wasn't protected (although it was a priority) and the works amplified the already existing degradation. The percentage of losses (interior painting and interstitial canvases) is represented in the Table 2. Here we can observe the critical situation of the interior painting of this church and the importance of emergency interventions on it. The major losses of painting layers are on the walls, while inside the narthex we found only marks of ground, paint and tow faces of saints. For the rest we can distinguish some saints and its borders (Fig. 7a,c). On the narthex ceiling, nave and altar arch we can see entire iconographical program but the state of conservation of the painting layers is precarious.

**Table 2.** Percentage representation of losses of painting layers and interstitial canvas

Area	Material	Losses
Narthex walls	Painting layers	45%
	Interstitial canvases	45%
Narthex ceiling	Painting layers	20%
	Interstitial canvases	40%
Separation wall narthex - nave	Painting layers	40%
	Interstitial canvases	10%
Nave walls	Painting layers	35%
	Interstitial canvases	30%
Nave arch	Painting layers	15%
	Interstitial canvases	30%
Iconostasis	Painting layers	30%
	Interstitial canvases	35%
Altar walls	Painting layers	35%
	Interstitial canvases	70%
Altar arch	Painting layers	10%
	Interstitial canvases	35%

The wood panels of the icons and icon supports are deteriorated as a result of beetles attack, functional used, covering with towels and rugs. These present flaking, breakings, wears, losses, dirt, smoke, oil varnish crusts (Fig. 8.). On the front of the icons we observed many interventions with repainting of the faces of saints and of the lost parts (Fig. 9.).



**Fig. 8.** Macro photos at painting layers: a - wall painting, b - icon, c - icon support





Fig 9. Detail of repaint area on St. Mikhail icon – using a UV lamp

### ***Recommendations***

Each wooden church is an individual case and all interventions have to be adequate to all found problems and characteristics, because the development of damages, degradations and deteriorations have different causes and effects, the attacks are different for each wood species and need different treatments [19, 20].

The first step is the elaboration of the scientific projects for conservation, preservation and restoration of the entire monument as well as for the interior painting.

Emergency interventions are necessary outside for renewing the shingle roof cover. The shingle changing must be carried out with other handmade shingles from high quality wood (spruce) and respecting the traditional techniques. The outside plaster must be carried, consolidated, completed and blanched. The basement has to be rebuilt with stone, above the ground without filler.

Inside, at the boards' floor insecticide treatments, water isolation between the ground and the boards by free spaces or with aggregate are required. The wall beams need insecticide and fungicides treatments, but we must be careful with the effects on the mechanical and chemical properties and their visual appearance on the wood and the painting [7].

Regarding the interior painting, emergency interventions for the consolidation and preservation of the painting layers, wooden support and interstitial canvases (insect and fungi treatments, prophylactic consolidation of painting layers, consolidation of wood, gluing of interstitial canvases, removing of all unconstitutional objects) are prescribed and in the near future the restoration of entire painting. We want to point out the fact that all intervention has to start after the preventive conservation of the painting layers. The icons, tetrapodes, rush holders and other valuable objects must be soon included in a conservation, preservation and restoration process.

It is recommended that all paper icons without value, towels, rugs, decorations should be removed and all iron nails should be carefully extracted. The ceremonial flags must be placed at a distance from the walls and the arches. Very important is the inside ventilation in a natural way through installing window screens (anti insects, birds animals), traditional gratings and keeping the windows open.

The monument has to be anti fire and anti effraction protected, using special alarms and fire extinguisher (with water mist for the interior painting) manually and automatically. For the

permanent monitoring of the interior microclimate (temperature and humidity) data logger is recommended to be installed.

In conservation, preservation and restoration actions on monument the same importance will be given to both the wooden structure and the painting and objects from the inside or outside. All interventions must not affect either the aesthetic or historic aspect of the monument, and its integrity has to be maintained [20, 21].

## **Conclusions**

The church from Boz village, Hunedoara County is a representative monument for the wooden architecture of this area, for Transylvania and for our country, from the beginning of the 19<sup>th</sup> century, because it preserves the archaic form of the plan and traditional techniques of building, plastering and decorating. The interior painting is made by an anonymous, yet a very talented painter, improver and prepared by a professional master. These characteristics are evidenced by his steady hand on drawing, painting and final retouches.

The wooden church is in an advanced state of degradation of its different components: basement, roof cover, walls, interior painting, boards' floor; needing emergency intervention of conservation, preservation and restoration. The important cause for its accelerating degradation is the infiltration of water through the highly damaged shingle roof.

The degradation and deterioration is a developing process and with each passing year the situation is considerably worsen. Emergency interventions are necessary for saving this representative monument and its valuable interior painting.

The first step is to implement the scientific project of conservation, preservation and restoration of the monument and its interior painting. The major priority consists in restoration of the roof, basement, interior painting and floor. But the interior painting needs to be preventively protected before any intervention is done on the monument. The fire and security protection is a priority for saving the monument to save the church from risk to which it is subjected.

For Mureş Valley area, which include Boz church, we have few wooden churches included in a scientific conservation, preservation and restoration program (for example: Micăneşti, Almaş-Sălişte, Bretea Mureşană, etc), while another ones were included only in projects for preservation and restoration of monument, without the interior painting (the church from Tisa, Şoimuş, etc) and most of the church was reconditioned without any scientific project. We have many good examples in our country in the field of scientific conservation, preservation and restoration of wooden churches and we hope to register in this area other wooden churches included in scientific programs.

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