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Wood Damages and Improvement in Rural Mosques: Ordu Mosque

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Abstract

This study discusses the damage to wooden materials, which is among the most common problems in the protection of wooden mosques and conveys this issue through examples of mosques in the region. In the case of Ordu mosque, the problems and interventions in wooden materials were analyzed. The condition of the wooden material in the building and the protection approach was examined through the protection and art report of the mosque, the relief and restoration drawings, and photographs. Problems have been identified in wood due to regional conditions, time, transportation, and lack of maintenance and repair. The approach of conserving the original parts was adopted, and the material was renewed at the point where there was deterioration, loss or decrease in strength. It has been revealed that the research in the field should be increased and new strategies for protection should be developed by evaluating the data holistically.

Keywords: *Rural architecture, wooden mosques, protection, wooden material, wood material damages.*

Kırsal Camilerde Ahşap Malzeme Hasarları ve İyileştirilmesi: Ordu Camii

Öz

Çalışmada ahşap camilerin korunmasında en sık karşılaşılan sorunlar arasında yer alan ahşap malzemedeki hasarlar konu edinilmiştir ve konu bölgedeki cami örnekleri üzerinden aktarılmıştır. Ordu ahşap camii örneği özelinde ahşap malzemedeki sorunlar ve müdahale şekilleri analiz edilmiştir. Camiye ait koruma ve sanat raporu, röleve ve restorasyon çizimleri, eski ve yeni fotoğrafları üzerinden ahşap malzemenin yapıdaki durumu ve koruma yaklaşımı çözümlenmiştir. Ahşapta bölge koşulları, zaman, taşınma, bakım ve onarım eksikliğinden kaynaklı sorunlar tespit edilmiştir. Temel koruma yaklaşımı olarak özgün parçaların korunması, çürüme, kayıp veya mukavemeti azalan malzemede ise yenilemeye gidilmiştir. Alan ile ilgili araştırmaların artırılması, verilerin bütüncül olarak değerlendirilerek korumaya yönelik yeni stratejilerin geliştirilmesi gerektiği ortaya konulmuştur.

Anahtar kelimeler: *Kırsal mimari, ahşap camiler, koruma, ahşap malzeme, ahşap malzeme hasarları.*

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1. Introduction

The historical wooden mosques in the rural area of the Black Sea Region are belief structures built from the late 15th century to the beginning of the 20th century. Although the first wooden mosque examples have not survived to the present day, the existing wooden mosques are accepted as the late examples of the first mosques. These examples represent the Turkish wooden mosque style (Küçük, 2017). The buildings, in which wood is the basic material, are part of the traditional architectural identity with the construction techniques and craftsmanship specific to the region. The buildings, examples of which we still see in the Black Sea rural area, have remained idle over time with the acceleration of migration from rural areas to the cities and the decrease in population, and have been neglected in terms of maintenance and repairs. On the other hand, while the new mosques in the area were built using up-to-date technology and materials, the existing architectural heritage became unusable and faced the danger of extinction due to inadequate laws and regulations and wrong policies.

The change and transformation experienced in rural areas around the world have revealed the problem of protection of the existing architectural heritage. In order to transfer the values of the works to future generations, a process that starts with the evaluation of the assets in the rural areas as cultural heritage has been put forward. This process first came to the fore with the Venice Charter (ICOMOS) in 1964, and the "rural" area was also included in the historical environment in the definition of the monument. In the next period, the protection of rural areas has been the agenda topic in various international statutes and regulations (Eres, 2020). In Turkey, the Venice Charter was accepted in 1967. The Convention for the Protection of the Architectural Heritage of Europe, confirmed on October 3, 1985, was ratified by Law No. 3534 of April 13, 1989. International conventions and approaches to protection have been generally adopted in Turkey (Eres, 2013). On the other hand, with regard to wooden structures, a wood committee for the protection of wooden structures was established within ICOMOS in 1972. In 1999, at the 12th General Assembly of ICOMOS, "Principles for the Protection of Historic Wooden Buildings" were accepted. The charter outlines the main principles and recommendations for the protection and restoration of historic wooden structures (ICOMOS, 1999). While conducting studies for the protection of architectural heritage in rural areas at the international and national level, it is important to determine what the problems in the field are and how the protection activities are carried out, and to convert them into usable information through analysis. Starting from this point, wooden mosques located in the Black Sea rural area and facing the danger of extinction are discussed in this study. In addition to representing the socio-cultural and economic life of the period in which they were built, the architectural heritage also carries the art of building construction, technology, information about materials and construction techniques of the period (Çakır & Sağıroğlu Demirci, 2021). For this reason, the deformation observed in the building and the factors causing this deterioration and the modes of intervention were analyzed and evaluated by putting forward an approach in the field.

1.1. The Role of Wood Material in Rural Architecture in the Black Sea Region

Figure 1. Examples of buildings with different functions using wooden materials in rural areas (Yalçınkaya, 2016; Serander, 2016; Buzlupınar Bridge, n.d.)

The Black Sea rural area has a rich building architecture as a region where wood is used as the basic building material and unique construction techniques are developed. Different techniques have been used in different construction elements and components of the wooden building with which different

functions such as serander, mosques and bridges, especially residences (Yalçınkaya & Sancar, 2010) (Figure 1).

The fact that wood is easily accessible and workable in the rural architecture of the Eastern Black Sea has made it one of the oldest materials used in the region for centuries. The tree species found in the region has different characteristics. The choice of the tree type to be used in the building and the place of use in the building comes from the tradition gained over the years (Eruzun, 1977). The most common type of wood used in buildings in the area is chestnut. It is followed by oak, valonia oak, pine, beech, fir, spruce and elm. The rich tree species found in the region have enriched the use of wood in the structures built (Biber & Kurak Açıcı, 2021). Due to the rainy and humid climate of the region, the stone material is used to separate the main spaces of the building from the high-humidity ground. Wood material, which is less resistant to humidity but is abundant in the region, is widely used in sections above floor level (Vural, 2005; Pınar, 2018). Wood also plays an active role in the construction techniques which is specific to the region and gives the building a characteristic feature. In particular, the main element that gives the buildings a characteristic feature is the external wall construction. In the wooden frame system, "eye stuffing" (göz dolması) and "amulet stuffing" (muskalı dolma), in the wooden stacking system, "wolf throat" (kurt boğazı), "ring throat" (çalma boğaz) can be seen (Özgüner,1970) (Figure 2).

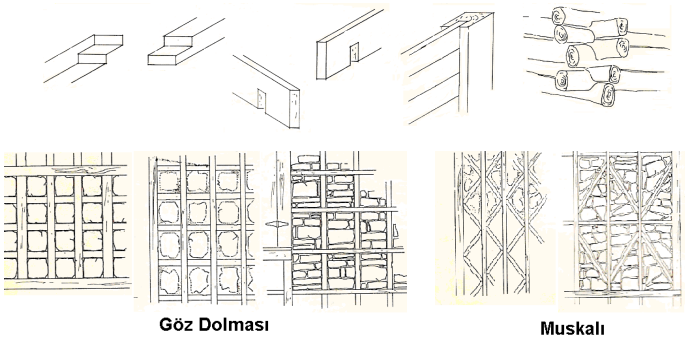

Figure 2. Local construction technique (eye stuffing, amulet stuffing and throat) (Özgüner, 1970)

1.2. Deformation of Wood Material in Rural Mosques in the Region

When the subject is evaluated in terms of rural mosques, wooden materials are used in many parts of the building in mosques. It is possible to come across the use of wood from the load-bearing system to the roof, from the minaret to the stairs (Figure 3). The environmental conditions of the tree from which the wood used in mosques is obtained can strengthen or weaken its features. Environmental conditions create anatomical defects within the tree and adversely affect the resistance and strength of the wood material. These environmental conditions continue to be effective on the tree, which turns into a building material in the process. Problems arising from both the physical environment and the user in the structures in the region cause problems such as deformation of section-surface in wooden materials, fragmentation in wooden materials, deviation (deviation from horizontal and vertical), deterioration, cracks and surface pollution, and loss of value in the original element.

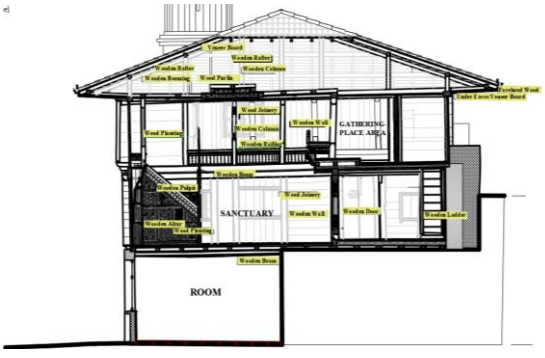

Figure 3. The use of wooden materials in mosques in rural areas

Environmental degradation: Regardless of which part of the building it is used, it is essential that the wood be dry. The Black Sea Region is a region with abundant precipitation, high cloudiness and high humidity. The physical, biological and chemical conditions caused by this situation can adversely affect the wood material. The intense humidity in the region causes irreversible damage to the wood material over time. For example, while moisture on the material causes swelling, an increase in humidity can lead to deterioration. Again, the humidity in the area causes the wood to deteriorate and the loss of parts. Humidity and heat change cause contraction and expansion in the material originating from the hygroscopic structure of the wood and affect the strength of the wood material. Too many repetitions of this situation cause cracks and split in the wood (Peker, 2010).

Atmospheric conditions such as rain, snow, temperature changes, UV rays, and wind in the region have more negative effects on the wood used especially in areas exposed to external atmospheric effects. Depending on the temperature, excessive dryness of the wood can lead to cracks, and if the temperature increases, it can lead to splitting (Perker & Akıncıtürk, 2006). The color change is common in wooden mosques due to water contact with the chestnut tree. The most deteriorated area in mosques is the floorboards of the roof and portico, which are exposed to external weather conditions (Uzun, 2016).

Another situation that causes damage to wood is the chemical interaction between the metal and the material. In mosques, the effect of wooden material on items such as locks, hinges, doorknobs, and door and window elements can be seen. Although the joints technique was used in the wood joints at the beginning, materials such as nails and screws have been used in the structure over time. Over time, there is an interaction between wood and metal, and the wood is damaged by the effect of corrosion.

Another factor that causes damage to wood is bacteria and fungus in the environment. Bacteria, fungi and insects can be physically and biologically effective on wood material. They commonly cause increased water permeability of the material, decreased strength, and damage such as odour, deterioration, cracking, discoloration and staining. Insects also cause damage such as flying holes, insect galleries and dusting on wood (Peker, 2010; Tunca, 2019) (Figure 4) (Figure 5).

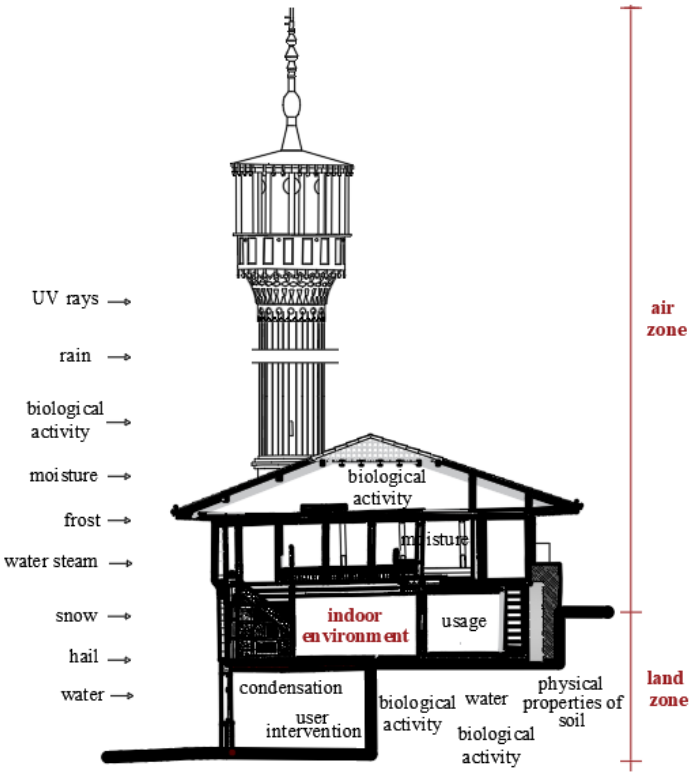

Figure 4. Factors causing deterioration of wood material

Figure 5. Examples of deformation in wood material originating from the environment in Wooden Mosques

Deformations Due to Human Causes: One of the main reasons for the deterioration of the wooden mosques in the region is the factors caused by lack of care and abandonment. Migration from rural areas to the city and the decrease in the population, the fact that reinforced concrete mosques are being built instead of repairing and maintaining existing mosques cause these buildings to be abandoned. The wooden mosques that still exist in the region today are matched with the last ones

built 50 years ago. The lack of periodic maintenance and repairs of the wooden material used in the mosques, the material being exposed to water and the surrounding vegetation, the loss of parts in the original building element or the equipment due to reasons such as wear and tear due to use, and the collapse of the building in case the problems experienced spread over time. In some cases, there is a process leading to destruction.

There is a need for heating and lighting in order to provide comfortable conditions in mosques. For this purpose, the installation system added to the space requires intervention in the wooden material from place to place. This unqualified intervention damages the building. In order to increase the level of illumination in the interior, there are examples of expanding existing windows or opening new spaces (Küçük, 2017; Uzun, 2016).

Depending on the needs that emerged over time in mosques, interventions were made to the original plan. The space can be divided or the gathering-place floor can be enlarged. This floor is made of wooden material, and the material may be damaged at the junction points of the new addition and the existing wooden elements. On the other hand, it is possible to come across examples in the region where deformations on wooden wall surfaces are used instead of maintenance and repair. The construction technique gives wooden mosques the ability to be dismantled and rebuilt. In this process, reasons such as changing the order of the wooden boards and loss of parts cause damage to the building in case of transport (Figure 6).

Taşkıran Mosque

Plumbing system attachment
Kondu Mosque

additional space, use of unqualified materials
Günebakan Mosque

Figure 6. Examples of human-induced deformation of wooden materials in wooden mosques

2. Material and Method

In the research, the problems and interventions in wooden materials are analyzed through the example of a rural wooden mosque. This analysis provides data to reveal the protection approach in the region and to ensure the sustainability of wooden mosques in the region. In the research, the analysis of the wooden mosque of Ordu village, which bears traces of the traditional building culture in the rural area, is included. Restitution, relief and restoration project reports, drawings and photographs of the building were used to designate the determination. Answers were sought to questions such as in which parts of the mosque in the rural area, what problems were encountered and what interventions were made as a solution to these problems.

Ordu Mosque, chosen as the study area, is located in Ordu village within the borders of Çarşamba district of Samsun province (Figure 7). The first place of the mosque was dismantled and moved to its current location due to the periodical overflow of the creek next to it, and the construction of this mosque is dated to the beginning of the 15th century.

The masonry bag (yığma çantı) technique was used in the building, which was built entirely with wooden materials. The mosque, which consisted of only the existing sanctuary section in the first period, has survived until today with the addition of the narthex and the portico section in both directions. Today, it consists of three places, the last congregation place, the main place of worship and the women's gathering place. The porched section, which surrounds the main space and is the second-period annex, is designed as a continuation of the narthex. The mosque, which had a flat housetop at the beginning, was closed from the outside with a hipped roof as an annex of the second

period. Looking at the life cycle of the building, it is known that its location has been changed and that it has undergone some additions and renovations in the process. This situation caused different periodic effects to be seen in the building (Eravşar, 2015; Zan Mimarlık, 2015a) (Figure 8).

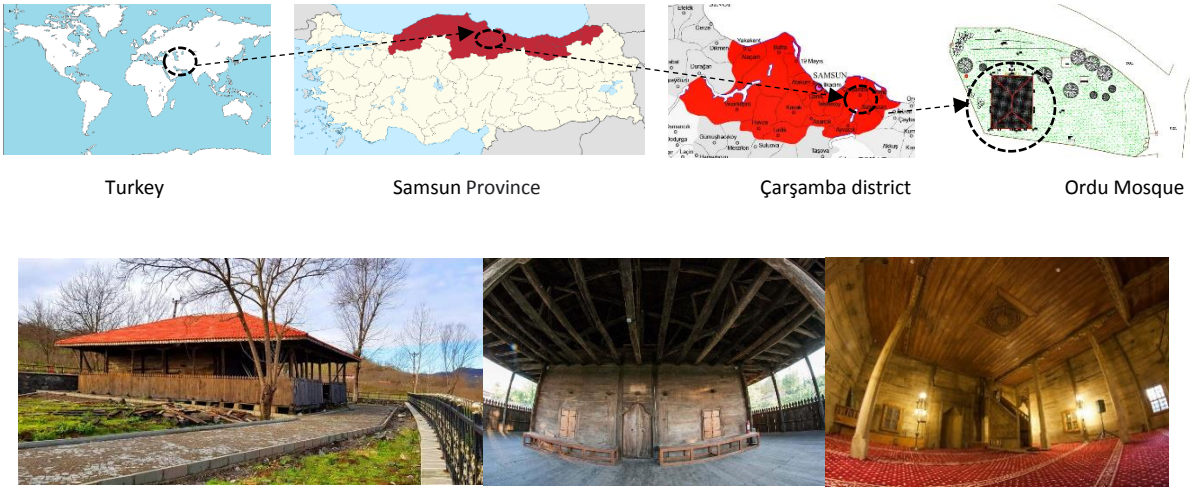

Figure 7. Location and general view of Ordu village mosque (Ordu Mosque, n.d; Zambak, 2019)

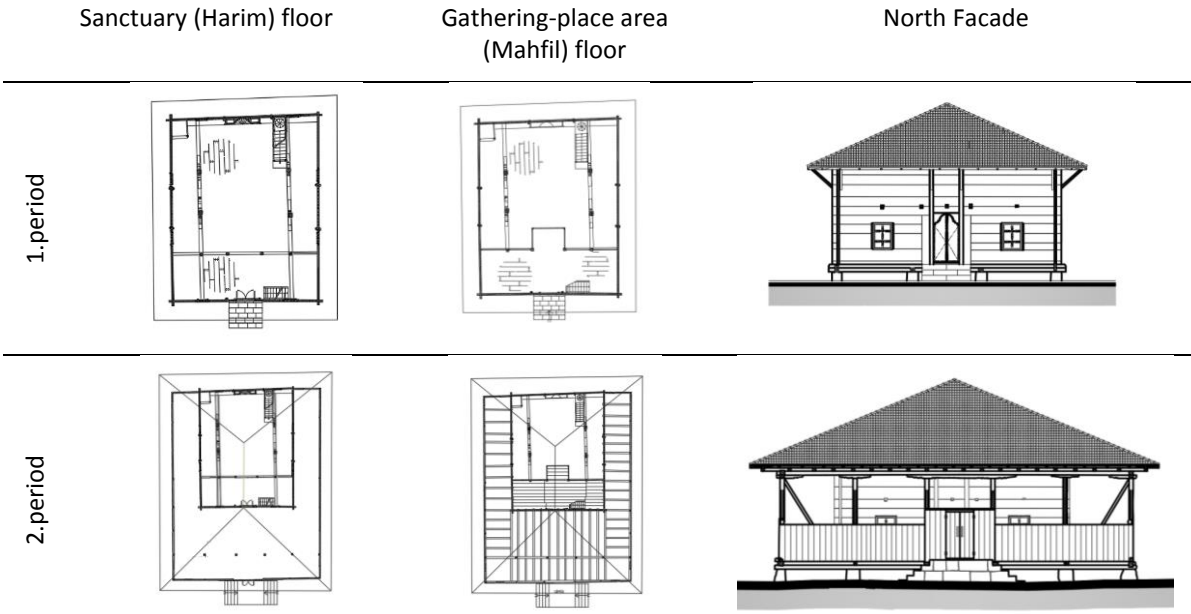

Figure 8. Plan, section and facade of the 1st and 2nd Period of Ordu Village Mosque (Zan Architecture, 2015a)

3. Findings and Discussion

When the condition of the wooden material in Ordu Mosque is evaluated, the location change in the life cycle of the building, the physical environmental conditions, and the additions and renewals made over time have caused different types of deformation in the wooden material. For the continuity of the building, it is aimed to protect its original character with the least intervention. The general approach for this is to eliminate the factors that cause physical deformation and repair the damaged points. In the study, the places of these deformations and the repair/renewal decisions are conveyed through the plan, section and view drawings and their photographs are included. Damages and interventions seen throughout the building are conveyed with the help of a model.

The condition of the wooden material in the building is discussed under two headings indoor and outdoor. When the deformation of the wooden material in the roof, narthex, portico and façade areas exposed to the outdoor conditions and the intervention made are evaluated (Figure 9);

Figure 9. Deformations and interventions in wooden material in Ordu village mosque; roof, narthex, portico and façade

- The fact that the columns, railings and beams in the narthex and portico section are open to atmospheric factors caused the formation of holes, cracks and crevices in the material. Again, physical damage such as deterioration, wear and tear were observed in the exterior wall coverings and flooring in this section (Zan Mimarlık, 2015b). In the areas that were problematic in the protection process, the surface was cleaned, and holes, cracks and crevices were filled and strengthened in the wooden material in the first step. The areas with high deformation were renewed in line with the original.
- The wooden balustrades around the narthex and portico sections of the building were deformed due to atmospheric factors. The damaged wooden balustrades were rebuilt with hardwood in line with the original (Zan Mimarlık, 2015b). Again in this section, the openings covered with metal gauze were restored by removing the metal.
- On the south façade of the mosque, the southeastern and southwestern parts of the portico were covered with unqualified wood. The woods in this area were removed and the portico area was completed with wooden railings and supported with wooden studs.
- Various reductions and deformations have occurred on the window door in the building with the effect of time. The damaged, missing and broken wooden parts on the windows have been renewed. The south façade of the mosque has two window openings to the right and left of the mihrab. These two unqualified windows have been removed and their gaps closed. At the entrance to the sanctuary, the surface was cleaned, and the damaged and rotten parts were taken care of; holes, cracks, and crevices were filled and strengthened (Zan Architecture, 2015b).
- Widespread deformation was observed on the roof. As a general approach, the solid elements were preserved in the wooden roof, and the damaged ones were renewed.

Ordu mosque has a sanctuary and a gathering-place area as an interior environment. Items such as the pulpit, mihrab and lectern in this area are made of wood. When the deformation of the wood material in the indoor environment and the intervention made are evaluated (Figure 10);

- Deformations and deterioration were observed on wooden walls, wooden columns and beams in the sanctuary and gathering place. Common contamination, loss-deformation and discoloration were observed on wooden surfaces indoors. The surface has been cleaned in the problematic areas, and holes, cracks and crevices have been filled and strengthened.
- Deformation and missing were observed in the wooden material in the core of the wooden ceiling. The damaged parts are refurbished from hardwood.
- Wood deterioration was common in the flooring in the sanctuary and gathering place. Corrosion was also found on the wooden staircase connecting the sanctuary and the gathering place. Problem areas on the floor and stairs were renewed with hardwood in line with the original.
- Physical destructions such as deterioration, wear and tear have occurred in elements such as the pulpit, mihrab and gathering-place kiosk, and lectern (Zan Mimarlık, 2015b). These items have been strengthened by cleaning the surface and filling holes, cracks and crevices.
- Missing and damaged sections were found on the railings on the gathering-place floor (Zan Mimarlık, 2015b). The railings were scraped and their damaged and missing parts were renewed.

Figure 10. Deformation and interventions in wooden material in Ordu village mosque; sanctuary, gathering place and wooden items

When the problems and interventions in wooden material in Ordu mosque are evaluated on the basis of the construction element and its element (Figure 11);

- 6 different types of wood damage were found on the wall element of the mosque. These are missing/deformation, contamination, addition, vegetation and deterioration in wooden elements. These problems were intervened in the form of strengthening the original wood, removing surface dirt and insect disinfection (spraying) and removing unqualified addition.
- Missing / deformation and deterioration were observed in the wooden elements of the flooring. For this, strengthening the original wood material, insect disinfection and reconstruction in accordance with the original were preferred.
- In the single bearing, contamination and deformation were observed in the wooden element. Here, the cleaning of surface dirt and painted surfaces and the strengthening of the original wood material were followed.
- Deterioration was observed in the beams and throughout the ceiling, as missing and deformation of the wood in the ceiling core. Filling of splits and cracks, strengthening of original wood, cleaning of surface dirt and insect disinfection were carried out.
- Deterioration in the stairs, door windows and railings, loss of deformation and vegetation in additions and materials were seen. On the roof, on the other hand, problems of losing strength have emerged. In these four areas, it has been tried to be reconstructed in accordance with the original.
- Filling the splits and cracks, cleaning the surface dirt and insect disinfection for the addition and contamination seen in the lectern, pulpit and mihrab in the building.

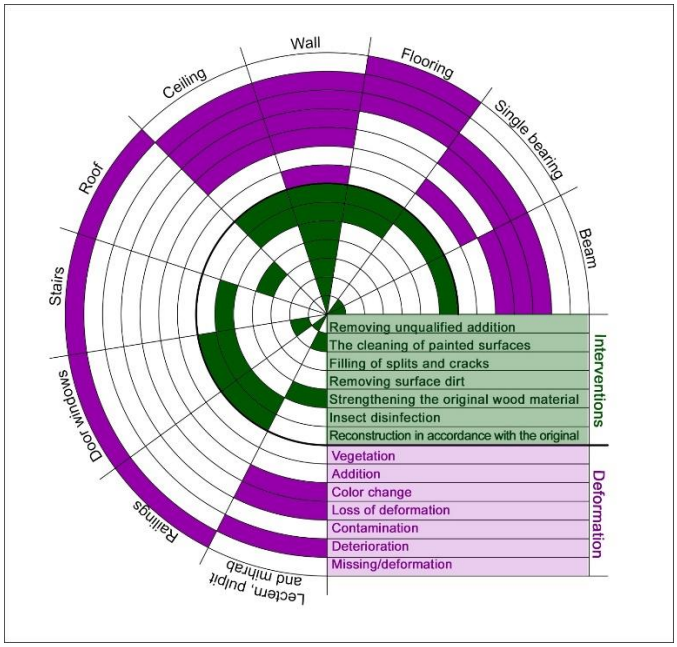

Figure 11. Deformation and interventions in wooden material in Ordu Mosque

Missing/deformation and deterioration of wooden material in the building are seen in points throughout the building and in larger areas in flooring. It is seen that the repair is based on the building in general, and the building element has been changed with the reconstruction in accordance with the original on the stairs, floor and roof.

4. Conclusion

The subject discussed in the example of the Ordu Mosque in the study, in fact, provides data for the analysis of the problems seen in the wooden mosques in the region and the approach to their restoration, and the development of a strategy for the sustainability of the wooden mosques in the region.

Although the wooden material in Ordu Mosque is in good condition in general, factors such as the wearing effect of time, climatic conditions and infestation have caused deterioration. Physical destruction such as size change, color change, deterioration, wear, breakage and corrosion has been observed in the wooden material in the structure, more intensely in the elements exposed to external weather conditions and acting as carriers. In the protection studies in the region, it has been found that in order to eliminate the problems in the wooden mosque and to ensure its continuity by protecting its originality, the approach is completely avoided, the traces and remains in the structure are preserved, and the traces of it are made to be read in possible interventions. Within the framework of this approach, it was determined that the factors causing physical deterioration in Ordu Mosque were removed and the damaged parts were repaired.

In rural mosques in the region, wooden material was used in many parts of the building, especially the load-bearing system. The lack of maintenance and repair of the wooden material in the building makes it more difficult to protect the building group with each passing day. It is seen that the problems caused by the factors that cause deterioration in the wood material in the regions are similar in general terms. The life of the material should be extended by increasing the number of research on this subject and analyzing the material in the buildings. A holistic protection strategy for buildings in rural areas should be adopted and the sustainability of the existing building stock should be ensured through regular maintenance and repairs. Thus, the richness of the rural architecture of the region and the country can be passed on for generations by keeping these architectural works, which are representative of the local construction tradition and reflect the social-cultural structure of the period in which they were built.

Acknowledgements and Information Note

Ethics Committee approval was not required for the study. The drawings and reports of Ordu Mosque were prepared by Zan Architecture. Used in the study with the permission of the company.

Author Contribution and Conflict of Interest Declaration Information

The article has a single author and there is no conflict of interest.

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