

TRADITION AND INNOVATION IN SERBIAN 21ST CENTURY ARCHITECTURE – THE NATURAL, STRUCTURAL MATERIALS' IMPACT ON THE HUMAN BEING

Predrag MILOŠEVIĆ ^{a*}, Vladimir MILOŠEVIĆ ^b, Grigor MILOŠEVIĆ ^b

^a Full Professor; Department of Architecture, University Union Nikola Tesla, Cara Dušana 62-64, 11000 Belgrade, Serbia
E-mail address: *pmilos59@gmail.com*

^b Student; Faculty of Architecture, University of Belgrade, Bulevar Kralja Aleksandra 73, 11000 Belgrade, Serbia

Received: 19.09.2018; Revised: 28.02.2019; Accepted: 7.06.2019

Abstract

The aim of this paper is to illustrate what is happening at present in Serbia through the analysis of traditional Serbian construction, i.e. the technique and the conditions under which it was created. However, as the reality of the subject is quite cruel in today's time, this paper seeks to show the value of the principles on which traditional architecture rests, primarily through the use of natural materials in construction. The reason for this is the inextricable link between man and nature, the very essence of their interconnectedness, as well as the creation of a healthy, aesthetically valuable and quality living space. Based on these analyses, many conceptual solutions will be attached, i.e. the proposal of contemporary interpretation of certain traditional Serbian houses that can meet the needs of modern man and age, where old tradition is implemented in contemporary Serbian architecture.

Keywords: Building; Impact; Influences; Innovation; Man; Natural materials; Tradition.

1. INTRODUCTION

National construction encompasses the folk way of building and architectural style that came as result of it. "The period when old village and town houses were built, before the western influences that characterized more modern time, before the villages started to look up to towns, before they experienced rapid change, pressured by the ever changing needs, results of contemporary (at the time) social and economic situation. Style should not be considered as a mould for certain aesthetic pretensions which can easily be cast into formalism, rather, it should polish and crystalize the aesthetics and beauty of architecture that develops spontaneously according to its surroundings and climate, this spontaneous style is most evident in the peoples' architecture, built to accommodate the needs of the common folk, who lived in relative poverty and, as



Figure 1.
Traditional architecture in northern Serbia, Vojvodina by Nikola Stojanović (1984) (Source: Forgotten face of a house by Nikola Stojanović, <https://agroplus.rs/zaboravljeno-lice-kuce/>)

result, came up with economic solutions – a house that needs to be only practical and cosy, without abstract

aesthetics and visual effects, and still shows the present need to be aesthetically well balanced and shaped” [1].

2. INFLUENCES UPON BUILDING

The key conditions for determining characteristics of any spontaneously generated architecture, mainly the type of architecture that developed by itself, independent of any fashions and styles, using only materials within its reach are:

- **the lifestyle**, work and industry of the people creating the architecture, with their needs on one side, and their economic and technical capabilities on the other. This factor influences the base shape of the house and its position in the landscape,
- **building materials** which the builders can utilise. This factor determines the type of construction and way of building, along with the shape and appearance of the building and its parts,
- **the climate** of the region. This factor dictates the need for protection from the elements, snow, rain, wind, cold, heat etc., and forces the house to adapt to its surroundings.

2.1. Lifestyle

When it comes to this factor, there is little difference between its effects in primitive societies and the most developed ones, all around the globe. Namely, the house presents the most basic protection for man, be it from climate or any other hazard. Apart from its basic role, being a shelter for rest and sleep, the house is also a workspace. Concerning this factor, it applies almost equally to primitive and well-developed areas, all around the globe. Namely, the house provides the most basic shelter to Man from climate and all other hazards. Along its primary role, to provide shelter for sleep and rest, it is also a sheltered workspace, constrained by four walls and a roof. The primordial houses were actually made up of a single room, isolated from the outside by four walls and a roof, with a fireplace in its centre. However, as civilization developed, so did the everyday needs of Man grow, and the house, as result, gained more rooms with specific functions, first, rooms for only sleeping and resting, and afterwards a front addition (porch), and rooms for storage, larders. The craft of the inhabitant plays a vital role, as the house is no longer simply a place where he lives, but a place where he does his day job and chores, depending on his job. Another influence on the house's appearance comes

from it being in the country or in the town. Namely, if the home is located in the countryside, it is built solely of local materials, that are found within reach of the inhabitants, for the common farmer did not have an abundance of wealth that would help afford any luxury. On the other side there are the townsfolk, craftsmen, traders etc. Who could even afford to “be fashionable”, when it comes to building materials.



Figure 2.
The physical map of Serbia showing major geographical features like elevations, mountain ranges, seas, lakes, plateaus, peninsulas, rivers, plains, landforms and other topographic features
(Source: Ezilon Maps, <https://www.ezilon.com/maps/europe/serbia-physical-maps.html>)

By looking at Serbia and its various provinces, Vojvodina, Šumadija, Kosovo and Metohija, the differences in the lives and needs of the country-folk and townsfolk are still present.

Alongside that, every province has its own distinctive geomorphic characteristics, its terrain, flora and fauna, as well as climate, the inhabitants had to adapt to when making their dwellings.

2.2. Building materials

This component, which greatly influences architectural development is a major factor on the global level, but it has very distinctive characteristics on the local, provincial, level, in the case of town and countryside homes [2]. As it has been said already, in towns and cities, the inhabitants were in a much better position to purchase various building materials thanks to their wealthier status, the village dweller was often too poor to build with any material that can't be found in his proximity. However, the decision on whether the house will be built from one material or another depended mainly on the climate and weather affecting the building site [3]. If the region is abundant in forest, it is undisputed that the home will be built of lumber. The same applies to regions where rocky hills and stone dominates the terrain, or the ground itself can be a good material, for instance in Vojvodina houses are mostly of rammed earth, in central Serbia lumber is dominant, and in the seaside regions stone homes are very common.

Vojvodina

Having said that in the past people used to build homes with materials within their reach, and knowing that Vojvodina has only 6% of forest and woodland areas on its territory, we can easily see why the main material for building was earth.



Figure 3.
Traditional architecture in northern Serbia, Sutjeska, Vojvodina (2005). An old house to the right now demolished (Source: authors archive)

Aside from the “**rammed earth**” technique (which implies ramming the earth into moulds until it is so densely packed that it can bear the roof), among other widespread techniques are “**čerpič**” (sun-dried earth bricks) and “**pleter**” – a technique mainly found

on the brinks of Fruška Gora (one of the two hilly areas in the dominantly flat Vojvodina plains), that is composed of a wooden structure, with knit filling, with a coat of mud used as a finish layer (compare with wattle and daub).

Other than these three principal techniques of building, there is another interesting, though rarely used, technique, of building with “**busenje**” – which means turf/greensward, pieces of the ground with all its organic layers and grass cover, there are also remains of homes implying the presence of “**putrika's**” – houses with a flat, green roof.

Although buildings made of earth had a mostly residential purpose, sometimes economic and storage roles, they also used to house traditional crafts such as mills (including water and windmills).



Figure 4.
Traditional architecture in northern Serbia, Sutjeska, Vojvodina (2017). Same house from Fig. 3. in current surrounding, a new wall in place of an old house now demolished, to the right, that belongs to dentist's brand new luxury home more to the right (Source: authors archive)



Figure 5.
Brand new dentist's home (2008) by unknown author in northern Serbia, Sutjeska, Vojvodina (2017). Living new life in traditional forms (Source: authors archive)

Two sacral objects made using earth building techniques still stand to this day: the monastery at Botoš and a church in Ečka, near Zrenjanin.

Central Serbia

As a result of the mass use of lumber as the sole building material in the region around the mountain range that sprawls from the Slovenian border and south-west Bosnia, a unique form of chalet developed as one of the basic residential forms. The walls, as well as the roof and constructive elements are made entirely of wood. Dependent on the terrain, the chalet could have a stone foundation and ground floor, log walls, wood plank roof construction covered with wooden shingles, if it was steep, or, in more levelled areas of Central Serbia, the common house (non chalet) has a constructive skeleton of wood planks, with the gaps between planks filled with sticks or smaller wood pieces, glued together with mud.

Kosovo and Metohija

The base material of most houses in this region was “*čerpič*”, sun-dried mud bricks, which can be reinforced with long horizontal beams. The house facade was shaped very simple, without finishing layers, and the roof was mostly terracotta. In areas where there was stone present that could be used as a covering material it was also used for walls. In villages there were also residential stone towers, built in simple, basic shapes with massive walls. These towers were built out of need for protection, due to the unstable environment. Another characteristic of this area, as well as the eastern parts of Serbia and Macedonia are “*bondruk*” houses. Their main characteristics are a wooden constructive skeleton, walls made of sun-dried bricks, small planks or straw, glued together with mud, and a roof covered by terracotta shingles. Houses were built this way out of purely economic reasons – the goal was to create a habitat suitable to the mild climate in this region, a climate without strong snow or very cold winters.

2.3. Climate

Basic knowledge of climate, its types and characteristics/features comes very useful when working with traditional architecture. Climate defines the long-standing weather of an area, factors like: rainfall and humidity [4]. Depending on these factors and their combined effect, various climates emerge worldwide. Climate is determined by the geographical latitude

(distance from the equator), as well as proximity of large water masses, such as the ocean and its currents [5].

Taking climate and its effects into consideration is nothing new in the art of building. It dates as far as the IV century B.C, to ancient Greece, possibly even further into the past. Even Vitruvius stated that when planning a building, one should take into consideration the climate of the region and soil on which the building will be erected.

In Serbia, the climate is affected by large and faraway lands, above which giant air masses form, with different properties – warm, cold, dry and moist, concerning locations of these masses, Sahara and the Mediterranean Sea, the Atlantic Ocean, Siberia and the Arctic. Dry and warm masses flow from the Sahara northward, attain a lot of moist on the way, upon reaching the Dinaric mountain range, they rise above them, cool down and release the moist with heavy rain. If, by any chance, they pass above the mountains, they descend, get warmer and when they reach the Pannonia basin, they have very little moist left, which results in light rain, if any. The Atlantic is about 1800 km from Serbia’s western border. It is a constant source of warm, moist air, brought by the western winds. In winter, however, cold air from Siberia and the Arctic dominates the climate, bringing cold and dry weather.

A major element that affects climate is the plant life covering the soil. Namely, naked terrain (with little or no plant life growing on it) heats up faster during day than forest or grassland terrain.

Forest decrease the speed of wind, make more humid environments, due to more evaporation, and keep the snow longer.

Serbia has two distinctive climate zones – the Pannonia basin and mountain climate zone.

The **Pannonia** zone has a slightly mild continental climate, with more rain and smaller oscillations than the true continental climate of Eastern Europe. This type of climate appears due to the location of the basin – it is isolated from the seas with great distances and large mountain ranges. It is a climate of hot summers and cold, harsh and frosty winters. As in all continental sub climates, spring and autumn are relatively short. At the end of winter, after a period of rain and strong winds, the snow cover rapidly melts and succeeding a short spring, summer arrives. The summers here are not at all milder than the blazing ones in seaside regions. The summer is hottest in Bačka and Banat, in the zone of the “*Deliblatska peščara*”–

large areas of sandy terrain, similar to deserts. In the second half of the summer months, the air gets extremely hot; the earth dries out and cracks. Rain is abundant in the end of spring and beginning of summer, when the crops need it most. However, there are also exceptionally dry years, when these spring rains are not as abundant, as effect, droughts come often and last long. Due to the harsh winters, hot summers and little rainfall, Bačka and Banat have a climate similar to the steppe continental climate. The entire Pannonia basin has very little forests and rocky areas, it is quite logical that the base construction material is soil.

The **mountain** climate is present in areas above 800 m in height. It is characterized by short, fresh summers, that pass into autumn as early as August, when the cold mists set in, and long, very cold winters, abundant in snow. There are three subtypes of climate in the mountains: mild-continental climate, mountain climate, and the “župna” or valley climate, present in mountain valleys, that presents a stage between the mild and mountain continental climates.

The “Župa” climate is common in the lower mountain valleys, well isolated from cold winds. These valleys are usually between mountain ranges and next to rivers (the Župa basin between Kopaonik and Jastrebac, valleys around Požega and Metohija, Sirinić valley). These areas are warmer than the neighbouring areas.

Mild continental climate is present in areas bordering the Pannonia basin and in the mountain areas between 600–800 m in height. It has mild warm summers and mild cold, snowy winters with distinctive spring and autumn.

3. IMPACT OF NATURAL MATERIALS ON MAN

There has already been word of the way materials used to be picked for building purposes. As direct “products” of nature, these traditional materials are not hazardous to humans or their environment. With that in mind, so called “eco-friendly” building is growing increasingly popular [6]. The principles of this trend are full recyclability of materials, the use of non-hazardous materials and planning a living space that ensures sustainability [7]. This “idea” often uses materials that appear warm and cosy as finishes on the façade, in all types of building, including contemporary churches, as two shown below, very distinct ones, but not only by materials. However, the reality is a whole plethora of various glues and additives that

release toxic vapours in the air, this aspect is very delicate and little is spoken of it, for sake of maximising profit.



Figure 6.
Brand new wooden church of Saint George the Martyr (2015) by Miloš Kapor on Vjenčac, Nevesinje, Herzegovina, southern Srpska. Old tradition implemented in contemporary Serbian architecture (Source: authors archive)



Figure 7.
Bell tower of Saint George the Martyr Church (2015) by Miloš Kapor on Vjenčac, Nevesinje, Herzegovina, southern Srpska. (Source: authors archive)



Figure 8.
Trinity Church (2002) by Predrag Ristić, Gacko, Herzegovina, southern Srpska. (Source: authors archive)



Figure 9.
Bell tower of the Trinity Church (2002) by Predrag Ristić, Gacko, Herzegovina, southern Srpska. (Source: authors archive)

The title of this paper means that it will cover two main aspects of materials – one is the medical aspect (concerning the health of consumers), the other is the psychological aspect that concerns how we feel when in contact with natural materials [8].

3.1. Wood

Generally speaking, wood is not a hazardous material. On the other hand, particles that come of wood can be dangerous, with toxic and even cancer genic effects. Dust of any kind can irritate the respiratory system, and some species of trees can be irritating to the skin and eyes as well.

The negative impact of some sorts of trees has been known for centuries. The Roman historian Pliny the Elder, as far back as 60 AD describes an event where four Roman soldiers died after drinking wine from a bottle made of yew. A less lethal experience hap-

pened to a group of German woodcutters in the early 18. Century, who experienced chronic irritations in their eyes and noses along with strong headaches after working with cypress trees.

Statistics say that a minority 2–5% of people have allergies involving one or several substances present in trees. Some sorts cause problems no matter how long you have been exposed to them, they affect everyone without exception. Dust is the most notable irritant that affects the nose and eyes, leading to sneezing and sores. Particular sorts have even stronger dust, like the red cedar. And some sorts (rightly called “irritants”) can cause painful rashes (allergic dermatitis/irritant dermatitis) as well. The rashes are usually red and painful, swollen and sometimes with sores, it first appears between fingers. “Irritant” species include acacia, ebony, oleander, sequoia and yew.

Woodworkers and woodcutters have a 5–40 fold higher chance of getting cancerous disease compared to people who don’t work with wood. Though research hasn’t determined which substance induces cancer (because of the long latent period of 30–50 years), there might be some indications that point towards sawdust that contains large concentrations of tannin, species like chestnut, oak and cedar.

There are a lot of folk beliefs concerning the effects of trees on the health of people, they mostly determine the effects of trees that grow near the home, that induce better health and prosperity for the family by protecting them from “negative” energy.

Linden helps with the digestive system, notably with lower intestines and the stomach. Its bio-energetic field fills the organism with energy and brings positive emotions

Birch is good for the skin and makes it softer. It also protects from fear and panic, strengthens the soul and promotes healing. It also has benign effects on eyesight, the circulation of fluids, limbic system and strengthens the kidneys.

Pine promotes circulation and exchange of matter in the organism, cures respiratory disease and brings back balance to problems with circulation. It also cures headaches and heart disease. A forest of pines is the best place to get back in shape, due to this many fitness and spa centres are built surrounded by this wonderful tree.

Oak helps with tachycardia, its energy strengthens and encourages, gives strength and clarity to the mind. Oak is a tree that helps with life’s difficulties. A masculine tree, as such, helps with urogenital problems, teeth, gives strength and empowers.

Acacia is a universal donor of energy. It provides a soothing sleep and brings back optimism and good mood.

Fir is used in treatment of sores, as a painkiller and in treatment of depression and nervous disease

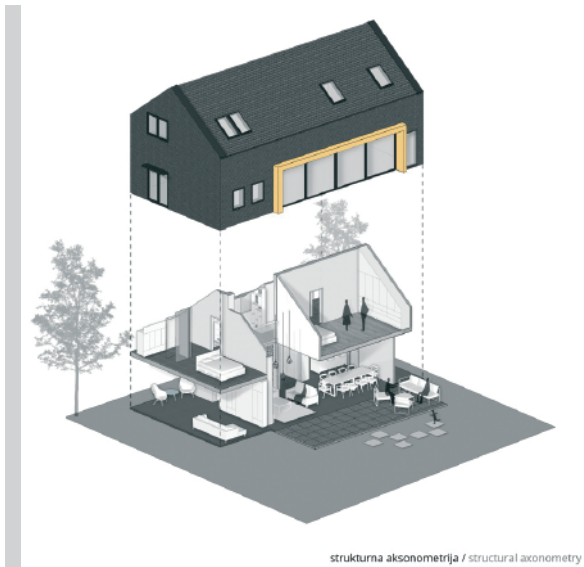
Chestnut balances heart rhythm, and strengthens the immune and nervous systems.

Cedar is benign to sexual activity, helps people who are recovering from hard diseases and has a bolstering effect on emotions

Juniper is good for the skin and helps heal acne.

Rowan (mountain ash) cleanses the organism and eliminates toxins, it is a mild donor of positive energy.

Apple is a strong feminine tree. It awakens emotions and helps a fragile woman become more confident.



Figs. 10 and 11.

Example of modern interpretation of traditional house in Vojvodina, northern Serbia: Rilaks' Relax House, Alibunar, Serbia, ModelArt Arhitekti (2013).

(Source: <https://www.mojenterijer.rs/arhitektura/moderna-vikendica-u-alibunaru-protkana-tradicijom/13#sekcija>, <https://modelart.rs/portfolio/kuca-rilak-rilak-house/>)



Figure 12.

Example of decorative facade that imitates wood, very associative to traditional Serbian building and applicable in a house interior as well: N1 Housing, Kragujevac, Serbia by Studio Simovic. (2016)

Source: <https://noizz.rs/kultura/drvena-zgrada-iz-kragujevca-medu-najatraktivnijim-mestima-za-stanovanje-iz-celog-pz2pkxn>

Ash calms the mind and helps in making the right decisions.

When it comes to wood that is used as a building material and has gone through the production process, like in structures of famous film director Emir Nemanja Kusturica's brand new Andrić Grad on a confluence of Drina and Rzav Rivers in Višegrad, Eastern Srpska (a City of Ivo Andrić, Serbian Nobel Prize Award winner in literature) the following characteristics are noteworthy: it makes the interior climate better for life, because wood is a regulator of humidity.



Figure 13.

Example of possible decorative roof/ceiling: Hydroelectric of Srpska Headquarters, Visegrad, eastern Srpska by MitArch (2014), within Andrić Grad on the Drina River by Emir Nemanja Kusturica. (Source: authors archive)

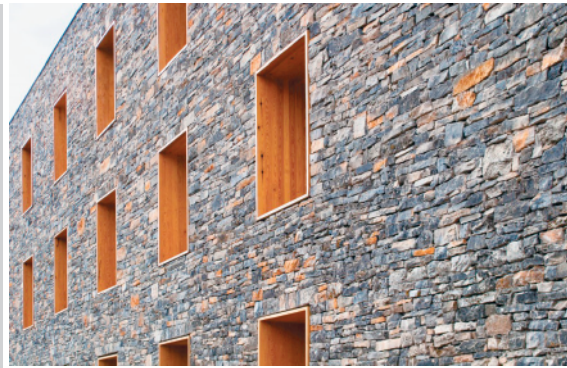


Figure 14.
Example of possible decorative window/wall: Hydroelectric of Srpska Headquarters, Visegrad, eastern Srpska by MitArch (2014), within Andrić Grad on the Drina River by Emir Nemanja Kusturica. (Source: authors archive)

It acts like a sponge and absorbs toxins from the air, effectively decimating them and hence helping the immune system. It also doesn't emit any radioactive particles, gasses or fumes, nor static electricity or hazardous dusts, for it is not of mineral origin. Wood also deflects magnetic forces coming from the earth's core which are potentially harmful for man. It is a natural accumulator for carbon and absorbs carbon compounds from the air (like CO₂) and neutralizes them. During the burning process it emits as much CO₂ as it absorbed previously through photosynthesis. It keeps its organic abilities even after it is cut and processed, it has a pleasant feel and smell and still acts as a filter for impurities in the air. Lengthy tests have established that wood generally lifts the spirit and makes an environment healthier.

3.2. Ground

There has already been mention of ground and its potentials that are, unfortunately no longer exploited in Serbia as they are in the world (even though many countries have forbidden the use of this material). Namely, countries considered rich in the modern times, but poor in terms of woodland or stone (basic building materials that can be used locally for building homes), are actively working on the development of new techniques for building with earth work. The technique in question is rammed earth. Due to ground being composed of water, air and solid mineral and organic matter, with the addition of stabilizers like sand, fibres or lime, it is predominantly natural and doesn't pose a health hazard when used for construction.

One of the greatest advantages of this material are its easy maintenance and the humidity regulation it pro-



Figs. 15 and 16.
Town house PM, Zemun, Belgrade, Serbia (2016) by ArhiArhi (Predrag, Vladimir and Grigor Milošević) (Source: authors archive)

vides. The best example of this is the oldest rammed earth building in Europe, located in Montbrison, France, and it is currently used as a library for moist sensitive books.

The next characteristic of earth is exceptional acoustic insulation. Being a natural material it also lets the building breed and prevents allergic reactions of the inhabitants, as well as any other respiratory disease. To sum up, the main benefits of using earth as a building material are its energy-efficiency, quality of air and acoustic insulation (the surface layer of rammed earth walls is covered by a non-toxic material that protects it from outer influences and the earth itself absorbs sounds), it is also non-flammable, resistant to earthquakes and floods and easy maintenance.



Figs. 17 and 18.

Villa Herzeg M, Rudo Polje, Gacko, Hercegovina, Srpska (2017) by ArhiArhi (Predrag, Vladimir and Grigor Milošević), in construction (Source: authors archive)

3.3. Stone

Stone has been used since time immemorial as a tool, weapon, jewel, living space (caves and stone homes) and burial tomb. It is one of the most prolific crafts of man. In the past, man was closer to nature and so was his building style, so the shapes, forms and building heritage are in a great amount indebted to stone as a material deeply woven into all traditional and natural arts and crafts.

This paper hasn't covered techniques involving the use of stone, for this material was only suitable for large scale building in maritime regions on the Adriatic coast, in Istria, Serbian Krajina, Dalmatia, Hercegovina and Montenegro, where it is abundant. Although stone has been used on the territory of today's Serbia, its use has mostly been for foundations and basement building, not for entire houses, it is still worth mentioning the impact of stone building on health. Namely stone is a geo-material, a non-metal mineral compound. Besides its decorative aspect it also has exceptional mechanical abilities, which are key to successful analysis of the material. Many characteristics of stone are directly related to its structure (the size of particles that compose it, and their density), texture and chemical composition.

The most valuable of these characteristics is good thermal insulation.

Both, traditional and modern stone houses, as the one recently designed below, are cool in summer and warm in winter, as they prevent the transfer of temperature between interior and exterior, which makes these homes comfortable for living. However, one of the disadvantages is the humidity.

Due to the fact that stone absorbs moist in direct contact with water or moist, it is often covered in resin or similar materials that fill in pores, which are directly related to the structure of stone. Apart from its excellent insulating characteristics, it is almost completely flame resistant and can break only on temperatures higher than 550 degrees Celsius. The maintenance of stone walls comes down to occasional washing with water or applying a new surface cover.

The importance of choosing the right materials, both for construction and finishes for roofs, walls, floors and cladding, as applied in the bellow recent design of a luxury villa, is best seen in the so called **"ill building syndrome"**, a clear indication of the air quality in buildings. For a building to be considered "ill" at least 20% of the inhabitants need to display particular symptoms in a period of two weeks, an even better indicator is the gradual disappearance of symptoms after being away from the building.

The fact that this is called a syndrome tells us that it is composed of a few symptoms that can appear together, and that the connection between symptoms can be unknown. There are five main symptoms that characterize the ill building syndrome that can appear individually or in pairs, they are as follows:

- Irritations in the eyes (itching, rashes and dry eyelids),
- Nasal manifestation (clogged nose, irritations and allergies),
- Symptoms tied to the respiratory system and throat (dry throat, short breaths without lung infections),
- Headaches and migraines, fatigue and discomfort, and
- Dermatological problems (dry skin, rashes and irritations).

It is often the case that a disease tied to a particular building came to being as a development of the syndrome. For example, due to dust in semi-desert areas like Deliblato sand-dunes in Južni Banat, as shown in the design bellow, moist or water that induce the syndrome, if left unchecked, make fertile ground for bacteria that lead to further illness in the building.



Figs. 19 and 20.

Farm house Green Dunes, Deliblato, Alibunar, Vojvodina, Serbia (2017) by ArhiArhi (Predrag, Vladimir and Grigor Milošević), in construction (Source: authors archive)

The other issue that illustrates the quality of air in a building, leads to disease tied to the building. This issue always succeeds the ill building syndrome. Medical diagnostics determine the specific health issues. After diagnose for an illness is set, it is much easier to determine the source.

The diseases that fall in this category are various allergic reactions and infections, as well as many illnesses induced by bacteria, fungi and viruses.

The source of pollution in buildings can be construction materials, furniture, office equipment, various devices and appliances, air conditioning system and various chemical actions (pesticidal, disinfection, etc.). This paper concentrates on the impact of materials on air contamination.

Asbestos – a group of six silicate materials that have similar specific traits (resistance to high temperatures, non-flammability, sound absorption). This material is very popular as a thermal and acoustic insulator, as well as a protective coat against fires in construction. It is also used as cladding for boilers and pipes, protective sprays and tiles. There are three main illnesses that can appear as a consequence of breathing in asbestos fibres: asbestoses (main symptoms are scars on the lungs due to breeding in asbestos fibres), mesothelioma (a type of cancer that

attacks protective tissue on all organs), and lung cancer.

Bio aerosols – various fungi, viruses, spores, pollen, small insects, decaying skin cells and feathers. The sources of these substances are found in thermal insulation (if it becomes wet), carpets and rugs, tapestries, tiles, furniture, stale water in the sewer system, pets, plants, and insects. The notable symptoms of bio aerosols are sneezing, coughing, vertigo, breathing hardships, and tears in the eyes, lethargy, fever and digestive problems.

Formaldehyde – An easily evaporating organic compound used in a wide scope of products, present in buildings via wooden planks, cork, fabrics, insulating materials, fibreglass etc. The amount of formaldehyde emitted in the surroundings depends on the temperature and humidity of the air surrounding its sources. This gas causes irritation of eyes, ears, the nose, throat as well as sneezing, coughing, fatigue, rashes and severe allergic reactions.

Synthetic fibres – are a by-product in the production of textiles, industrial wools for insulation and roof covers – glass and stone wool, ceramic and specialized fibres. For all fibres that are small enough to be breathe in, and so reach the lungs, the main characteristic is that they are cancer genic and may cause no-cancerous health issues.

Evaporable organic substances – organic substances that evaporate into gases on room temperatures and lower the overall quality of air in buildings. Some of the most notable are: paints, resins, fuels, cooling fluids, cleaning agents, cigarette smoke and certain microorganisms. The symptoms of illness related to these substances are respiratory problems, sore throat, irritations in the eyes and nose, nausea, fatigue and headaches.

4. CONCLUSION

Concerning psychological sense, the effect natural materials on man depends mostly on perception. Perception is a complex psychological process. It is best defined as a first-hand knowledge of objects and events based on data received via sensory organs. This first-hand knowledge is the base for an adequate development of a complete piece of information. Perception in architecture also concerns the question of space that can be defined in two ways – space, geometry in three dimensions and – space, the field of perception.

In this case the second definition is far more suitable,

as it allows for the architectural work to be seen as a spatial whole and spiritual presence. The shallowness of contemporary architectural standards, that surround us all around, is notable for its lack of materiality. Natural materials like stone, brick and wood, let us perceive underneath the surface.

“Natural materials have the ability to speak for their own age and history” [9].

A completely new, fresh look can be accomplished on the old “bondruk” system with the use of glued wood and a decorative carved ceiling (nothing more than an addition of diagonal beams to the framework) much alike to their traditional counterparts.

Synthetic, prefabricated materials, glass curtain wall facades, polished metals and plastic masses, on the other hand, have a tendency to appear as a firm surface, that shouldn't represent neither age nor history of the space. These materials do not carry a dimension of time and do not epitomize the aging of the building [10, 11, 12, 13].

REFERENCES

- [1] Deroko A. (1939, 1940). Folk architecture I, II. Institute for Folk Art of the University of Belgrade. Belgrade.
- [2] Milošević, P. (November 2004), The Concept and Principles of Sustainable Architectural Design for National Parks in Serbia, *Spatium*, International Review for Urban and Spatial Planning, Architecture, Housing, Building, Geodesy and Environment. Institute of Architecture, *Urban and Spatial Planning of Serbia*, 11, 91–105; ISSN 1450-569X. Belgrade.
- [3] Ministry of Environment, Mining and Spatial Planning. (2008). National Sustainable Development Strategy 2008. [online], http://www.ekoplan.gov.rs/DNA/docs/strategija_rs.pdf; 2008.
- [4] Hudman L. E., Jackson R. H. (1990). Geography of travel & tourism. Thomson Delmar Learning, Cengage Center. London.
- [5] Fürst D., Ritter E. H. (1993). Landesentwicklungsplanung und Regionalplanung. Ein Grundriss verwaltungswissenschaftlicher. (Land development planning and regional planning. A floor plan of administrative science) Düsseldorf.
- [6] Commission of the European Communities. (1990). Green Paper on the Urban Environment. Brussels, European Commission.
- [7] Hubler H. K., Kaether J. (1999). Nachhaltige Raum- und Regionalentwicklung - Bleibt wo sie? Befunde, Perspektiven und Vorschläge, Wissenschaft und Forschung, Berlin.
- [8] Goppel K. (1991). Raumordnung und Recht, “Raumforschung und Raumordnung” (Spatial Planning and Law, Spatial Research and Spatial Planning), nr 2-3, Berlin.
- [9] Pallasmaa J. (2007). The eyes of the skin. Architecture of the Senses, Wiley-Academy, Great Britain, London, 31–32.
- [10] <https://agroplus.rs/zaboravljenolicekuce/> (Nikola Stojanović, Forgotten face of a home. Retrieved on July 17, 2017).
- [11] <https://ilovezrenjanin.com/najnovije-vesti/tradicionalna-vojvodanska-kuca-nastanak-razvoj/> (Traditional house in Vojvodina – Origin and development. Retrieved on May 7, 2015).
- [12] <http://www.forum-srbija.com/viewtopic.php?f=400&t=19106&start=20> (Tool of the self-taught builders – Folk architecture. Retrieved on September 12, 2016).
- [13] <http://www.municipiumskelani.net/osacansko-graditeljstvo/> (Osat master builders' architecture. Retrieved on March 15, 2018).