2021

Build Back Better

Experience Handbook
on natural building techniques
in partnership of V4 countries
& Albania

This publication is presented in the frame of **"Build Back Better - Implementation of natural building in Albania"** project. The project is co-financed by the Governments of Czechia, Hungary, Poland and Slovakia through Visegrad Grants from International Visegrad Fund. The mission of the fund is to advance ideas for sustainable regional cooperation in Central Europe.

This handbook is jointly developed by project partners with the support of experts and presents possibilities and potential of natural construction in Albania, taking into account local conditions and implementation in the context of earthquake damage recovery. It serves as a tool to popularize natural construction in Albania and as a training material for inhabitants.

In addition it presents an inspiring joint initiative of beyond borders to build back better, through strengthening partnership among countries and people!

CDC "Today for the Future" (Albania) and partners respectively, Municipality of Durrës (Albania), HumanDoc Foundation (Poland), The Polish Natural Building Association (Poland), Baobaby (Czech Republic), Organica (Slovakia) are thankful to all participants: architects, urban planners, specialists, students and experts from Albania, Poland, Slovakia and Czech Republic who shared knowledge and techniques on natural construction, conduct a discussion on the locally available materials and built up a pavilion with the application of natural materials and techniques in the school "E Re" in Durrës, with the outstanding participation of scholars, students and community of Durrës.

We are grateful to **International Visegrad Fund** for the support and encouragement on the exchange of experiences in the countries of the Visegrad Group and Western Balkans.

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Enclosed photos are taken during the project activities, with the consent of all participants.

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Experience Handbook

“Build Back Better”

On exchange of experiences and knowledge between Visegrad Countries and Albania on natural building and application of traditional and natural building techniques in Albania.

supported by

Visegrad Fund

OUTLINE

Special Opening Remarks

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Emiriana Sako, Mayor of Durrës Municipality

Durrës Municipality is an important region in Albania with a vibrant and vivid tourism, natural and architectural treasures. It is distinguished by its warm-hearted and welcoming local people and high flux of tourists that once visit the city, its beaches and countryside are bound to visit Durrës again. With the vision to become a key economic and tourism center in the Western Balkans, the innovative approaches are a crucial part of regional development.

Techniques of natural construction are cost-effective and contribute to positive environmental actions. In my capacity as Mayor of Durrës Municipality, fostered as well by my professional background in architecture, I found the Build Back Better project as a great opportunity of partnership in natural building techniques and approaches. The partnership between Municipality of Durrës and CDC "Today for the Future" dates back in years in social services, housing, environmental and infrastructural interventions and public services for disadvantaged communities. This project enlarged the partnership with organizations from V4 Countries: Poland, the Czech Republic, and Slovakia thanks to International Visegrad Fund and intensified the exchange with the Embassy of the Czech Republic in Albania.

The 6.4 magnitude earthquake of November 2019 caused severe damage especially to Durrës region. The natural disasters urge higher standards of safety and constructions and different innovative approaches of living in harmony with the nature in a positive and safe way. In this project I saw an opportunity to implement natural construction approaches in Albania. Certainly, in order to start such a process, there is a need to assess and plan realistic resources and identify most applicable techniques that would improve the lives of residents and would assure safety and sustainability.

My vision is to make the green construction movement more visible and educative for all citizens. “New Durrës”, the former swamp area, where the BBB project has developed its pavilion using natural building techniques and materials, is one of Durrës areas where such approach in public spaces maximize the purpose. The development potential in terms of natural construction in this area is possible and I am grateful that professionals of Durrës Municipality and V4 Countries managed to share their knowledge through project training, exchange and workshop. This experience delivered also in the form of this handbook is a tool to incite the use of natural building techniques for future investments

H.E. Jaroslav Ludva, Ambassador of the Czech Republic in Albania

On behalf of V4 countries, I would like to take the opportunity to extend my gratitude and reiterate my support to our Albanian partner CDC “Today for the Future” that led successfully an exceptional and inspiring project. My gratitude also goes to the local government authorities and their endorsement, the partners and cooperators in field, and most of all, to all people who were the heart of the project and whose interests were to the core of our support. Thank you!

To my conviction, the building methodology herein will be the future of construction. The technology is environmentally friendly, and at the same time affordable for those who want a house while keeping the costs at minimum. Building naturally has proved to be sustainable and strong, while complying with the standards approved in the EU countries.

While I look forward to other future cooperation, the commitment of the Czech Republic, and mine personally, towards Albania remains unshakeable at all levels. My heart grows heavy for those who lost their lives and suffered by the earthquake of November 2019, and yet, here we are together placing a cornerstone to build life back and better with hope and love.

Introduction

Introduction

Introduction of Project and Donor

The project **Build Back Better – implementation of natural building in Albania** is a regional project implemented in Albania (Durrës City) by partners of V4 countries and led by the Albanian partner CDC "Today for the Future" with the financial support of Visegrad Fund *(www.visegradfund.org)* for the period February – August 2021[1], under the monitoring and mentoring of the Embassy of the Czech Republic in Tirana *(https://www.mzv.cz/tirana)*. The project is aimed at achieving regional development, environment and tourism (increased awareness, education and improved regional strategies on environmental protection, climate change and sustainable development). The concept of natural construction has been rapidly developing in the countries of the Visegrad Group in recent years. The project aimed to share the knowledge and skills in the area of natural construction and its adaptation to local conditions by partners, architects and contractors of V4 countries and Albania.

- The project aims to provide knowledge and skills on natural construction and its adaptation to local conditions.
- The project aims to raise awareness and involve decision-makers and professionals in the process of using natural building technologies with the emphasis on restoration using energy-saving, recycled and environmentally friendly materials and technologies. The project goal is to foster and promote the exchange of experiences and further development of natural construction in the countries of the Visegrad Group and Western Balkans, especially regarding the challenges posed by rapidly advancing climate change.

Natural construction is based on the use of low-processed, natural, recyclable materials (e.g. clay, straw, wood). Building with the use of natural materials reduces costs and construction time compared to conventional methods and at the same time meets all the requirements of modern construction. Repairs are easy and relatively cheap. Possible demolition is quick and leaves no waste that is hard to recycle. Natural construction has a positive impact on tenants' health and is environmentally friendly, which is important given the lack of access to health care in the project area as well as the serious problem of waste disposal and high environmental pollution rates. Finally, this method of construction requires no special equipment and is less complex than the conventional one.

Meet the Project Partners and Collaborators

- **Community Development Center "Today for the Future"** (Albania) is the leading organization of the project.

[1] *The project is co-financed by the Governments of Czechia, Hungary, Poland and Slovakia through Visegrad Grants from International Visegrad Fund. The mission of the fund is to advance ideas for sustainable regional cooperation in Central Europe.*

CDC “Today for the Future” has notable records on mediation for the alleviation and resolving concerns of community such as building legalization, electricity supply, road construction and maintenance, separation of drinkable water from sewage etc. The organization has formed several initiator groups of communities – they managed to establish, mentor and put into operation a networking initiative, focusing on community issues. Moreover, the organization has managed to encourage and introduce groups of communities in decision making processes of local public institutions and government. *www.cdc-tff.org*

- **HumanDoc Foundation** (Poland) has many years of experience in working with Visegrad Funds *(the HumanDoc Foundation’s projects “Audio Description Over the Borders” was branded as the best project in 2018).* CDC “Today for the Future” and HumanDoc Foundation concluded a strategic cooperation agreement for the current project, as the first out of many planned for joint implementation. HumanDoc Foundation has supported the leading organization in the implementation of the project in terms of organization and cooperation with substantive partners from the Visegrad Group as follows. *www.humandoc.pl*

- **Municipality of Durrës** (Albania) is the main local government of Durrës representing an administrative-territorial unit. It has the authority over initiatives of local public interest in the territory of their jurisdiction. The Municipality recognizes the partnership with CDC-TFF in many initiatives of local public interest, like contribution to wellbeing, empowerment and to the local development. It also focuses on initiatives in the area of social and economic development, support for communities, use of good practices, social innovative solutions are core principles of partnership. *www.durres.gov.al*
- **The Polish Natural Building Association** (Poland) is the largest organization in Poland associating specialists in natural construction. It consists of over 80 professionals. They range from architects and interior designers to contractors, material producers, scientists and researchers. The activity of the Association is focused on education, training and popularization of natural construction. *www.osbn.pl*
- **Baobaby** (the Czech Republic) is an association formed by a group of architects, designers, craftsmen and artists, who see a considerable potential in the field of natural building using clay, straw and wood as the main building materials. The main goal of the association is to promote and innovate natural building. The organization has extensive experience in cooperating with OSBN with which it has already implemented a number of projects. *https://www.baobaby.org/en/*
- **Organica** (Slovakia) is an organization of craftsmen specialized in the use of natural materials. Their activities focus on the use of local resources to build healthy housing. It deals with the construction of new buildings as well as the reconstruction of the old ones. The organization has experience in cooperation with other project partners (OSBN and Baobaby). *www.organica.name*

Two entities of architects from Poland respectively MechBuild and eKodama, two Universities of Durrës (Engineering) and Tirana (Social Sciences) (Albania), private builder (the Czech Republic) and Urban Public Services of Durrës Municipality (Albania) joined the team of partners, while school “E Re” Durrës and community of Ex-Swamp Area of Durrës (recently named “New Durrës) were fully engaged in the active participation.

- **eKodama Studio (**Poland) is an architectural office specializing in natural design following the permaculture and deep ecology principles, with passion to combine trees and clay, natural plasters, earthen floors, straw insulation. *www.ekodama.pl*
- **Mech.Build** (Poland) is a group of experts in Cradle to Cradle, sustainable and regenerative design, and specialists in natural and upcycled materials. They design architecture, interiors, installations, gardens, urban spaces, interventions. They work in the spirit of sustainable development, using natural or recyclable materials, ecological and energy-saving solutions. They work consistently with the users of any space, searching for most adequate and functional solutions. *www.mech.build*
- **University of Durrës** (Albania) has recently developed professional course of studies related to engineering that, combined with studies in tourism, provides excellent knowledge to students in local development of Durrës region. *www.uamd.edu.al*
- **University of Tirana, Faculty of Social Sciences** (Albania), with the primary focus in the scientific research to support the development of social and human policies of the Albanian society, has joint the partnership. The university puts emphasis on the social perspective that natural building can positively contribute to local communities. *www.fshs-ut.edu.al*

Joint Initiative “Beyond Borders”

Joint Initiative "Beyond Borders"

Fabiola Laço Egro, CDC "Today for the Future" Representative

The concept of natural building has emerged as an approach to environmental management, during the post-earthquake build back in Durrës city. I led this project with the goal to implement a pilot project that would help to change perspectives in Albania. As a national NGO, "Today for the Future" focuses its work on improving the social life of the inhabitants in the areas of intervention. With the initiatives of the "Build Back Better – implementation of natural building in Albania" project, we foster a deeper connection between them and the places they inhabit.

I am thankful that Visegrad Fund supported this project. It brought an added value to the construction concepts in Albania by achieving to convene a gathering of the policymakers, international experts from V4 countries, NGOs, businesses, local specialists and students from Albanian Universities to share and gain knowledge and experience.

It's been more than 20 years that I work in the city of Durrës, focusing on the suburban and rural area's population reintegration and empowerment. These are the areas that are mostly affected by the uncontrolled internal migration process for 30 years. The process has led to problems of a whole host of neighborhoods and villages composed of private dwellings built with no construction standards, no urban planning, lacking appropriate infrastructure and public services. The basic material in the construction industry in Albania are concrete and iron. Facing the challenges posed by rapidly advancing climate change, it is important to step back and rethink what we can do to improve our wellbeing, starting from the families and homes to countries and to our planet.

It has become increasingly clear that the materials we choose to build with are affecting populations way beyond the users and occupants of these buildings. Unfortunately, historically disadvantaged communities in Durrës still continue to bear the greatest burden of pollution on their health, for example, Spitalle and Ex-Swamp area (urban waste landfill). Buildings contribute one-third of global greenhouse gas emissions, and so getting buildings to be greener and more natural, can offer one-third of the solution to climate change – and more.

Numerous volunteers and activists stepped up and wanted to be part of this project. With their help, everything ran smoothly and connected the community on a higher level. Our purpose as an organization is not only to build step by step bridges between people, communities, countries but in the meantime to raise awareness in order to change the behavior and mentality, help and orient the future generation for sensitive behaviors and actions in favor of the wellbeing of communities in harmony and protection of the nature and healthy environment. The group of volunteers of different ages that joined the action, has proven that there are individuals around the community of all ages who want to be active, embrace the eco-friendly ideas and are ready to

acquire new knowledge and contribute to building new realities. With this knowledge, they can not only pass it on to the future generations or transmit to their parents, families or communities, but they can also use it if another natural disaster strikes, such as the earthquake.

Urszula Martyniszyn, HumanDoc Foundation Representative

The project was aimed to introduce the potential and basis of natural building to, among others, help local people, as the ones that suffered most due to the earthquake, to have some practical tools in the future. This means also providing them with some basics of renovation in terms of new, easy-to-get technologies such as natural building. As *HumanDoc*, we mainly focus on the exchange and transfer of knowledge among the countries and partners with the assistance of local communities who can also actively participate in the process.

The general intention of "Build Back Better" project was to present the potential of natural building. On the one hand, it was supposed to be an answer to the urgent living needs of people who lost their possessions due to the earthquake that happened in November 2019. On the other hand, this project is an expression of concern and care for natural environment. It corresponds with the challenging awareness of the imminent climate catastrophe and, at the same time, remains an attempt to minimize the consequences of over-exploiting the planet. Moreover, it is also a comeback to our roots, appreciation of local values as well as renewable resources. Last but not least, it is also an area for unhampered knowledge and experience exchange of experts from Visegrad Group countries - people who fully agree with each other regarding the need of sustainable development and care for our common good.

The whole undertaking directly reflects the values of HumanDoc Foundation and fits to our concept of acting. As HumanDoc, for over 10 years now we have been taking care of promoting art, new technologies and educational, socially engaged actions, knowledge of Global South countries through media and implementing new solutions supporting social development or promoting entrepreneurship. During the last decade, we successfully implemented numerous interdisciplinary projects, which common concept was to support societies and to equalize opportunities. In practice, our values are turned into real action, among others as production of reportages from diverse places in the world or organizing International Documentary Film Festival since 2010 - the event gathers over 220 thousand recipients. Moreover, we improve the quality of higher education by introducing new courses at the universities. At the same time, we support our foreign partners, for example in Georgia or Uzbekistan in introducing a systemic solution for combating domestic violence throughout these countries.

We are specialized in a comprehensive management of complex, multi-stage projects which we implement with the support of experienced experts who share our values, such as in *"Build Back Better"* project, where the key was not only the idea itself but also cooperation with partners who truly share our point of view.

The final result of our work is this handbook which provides consolidated knowledge in an innovative frame. This publication aims to present to the readers new possibilities of natural resources in a local context, which at the same time translates into a global one. Also, in this sense natural building project is ideally suited to the goals of HumanDoc as it arouses the belief that our choices and their consequences have a real impact not only on our personal piece of reality, but they are an undeniably consistent part of a larger whole. The more aware our choices will be, also in terms of constructing and the use of local natural resources, the better for us.

Introduction of Area, Social Perspective and Development

Durrës is the second largest city in the country of Albania with a population of more than 400.000 inhabitants. Durrës has increased the complexity of the population by bringing together the community in urban areas, the community coming from migratory areas and the rural community within the 30 years of transition from dictatorial to democratic system 1990-2020.

Community residing in rural areas and areas populated by migrant population need admission to other social groups, a trend that exposes them to risk factors such as abuse, violence, deviant and delusional behavior. Durrës is a tourism center and geographically a connection point. It offers potential for development of agriculture, local tourism and agro-processing, which offer great chances for developing local and family economy. Based primarily on tourism, it integrated good resource management, income generation, job creation. The area has the potential of providing opportunities for the unemployed individuals and migration returnees.

As previously mentioned, exactly on 26th November 2019, the north-west Albania was hit by a big Earthquake with a magnitude of 6.4 Rihter. To address the effects of the damage and lost revenue as a result of the earthquake, the government concluded that nearly 1.08 billion Euro would be needed in all sectors for recovery. Calculated in figures, the most affected city was Durrës, where the estimated cost of damage reached 310 million Euro. The sectors that reflect the greatest needs are housings with 37179 damaged dwellings, which represent almost 76% of all needs followed by education and infrastructure with 32% of damaged educational constructions and one school completely destroyed. Undoubtedly, the manufacturing sector, business, tourism, heritage and agriculture were among the sectors most affected by the November 26th earthquake. Additionally, followed by the crisis of pandemic COVID-19 the number of tourists in the city decreased during 2020-2021.

The project started as an initiative in Durrës City to support decision makers, planners and executors of local policy in implementing natural construction concepts in the post-earthquake reconstruction process and improve the quality of construction in the managed area.

Natural Building

Natural Building

Natural Building Materials

Natural materials have their own beautiful specificity, they are not "produced" but are obtained directly from nature. They do not contain any harmful compounds; they remain healthy and beautiful. As they do not come from the factory, they are unprocessed or poorly processed, for example we do not use too much primary (non-renewable) energy and water to obtain them, we do not emit pollutants to produce them, as is the case with other highly processed materials. As a reminder, each kW of energy translates into pollution of the environment, and each factory uses enormous resources of water, which is slowly becoming scarce. If we think about the environment and our surroundings, natural materials are the best choice. One of the most important features of natural materials is also the fact that they are renewable: straw and hemp grow back every season and are biodegradable (they decompose quickly in wet conditions), for example after use they return to the ground or to our permaculture bed. Thanks to this, we considerably reduce generated waste. By choosing natural building and interiors, we not only act for the benefit of our health, but we also influence the quality of the environment around us directly in the amount of waste produced.

This is a very important change in the system as the standard (non-natural) construction industry is responsible for the production of 30-40% of all waste in the European Union. It consumes 32% of natural resources and 12% of drinking water, and 50% of energy in general is consumed in buildings. These are huge values. If this direction continues, our health and the quality of our environment will deteriorate faster and faster which is not good at all. Throughout the construction process, the production of waste in natural construction is reduced from 80% to 40% compared to standard construction. This is a huge difference.

It is also important that in our climate we spend about 80% of our time inside the buildings, we also absorb, inhale and influence what the building is. After all, it is obvious that we get sick more and more often, due to an excess of chemicals that are present in everything, including walls and floors. That is why it is important that the materials that we surround ourselves with are healthy and favorable to us. And these are natural materials.

It is also worth emphasizing that they come from a local source, so as not to spend energy on transporting them. In this way, we consciously have a positive impact on the environment. What natural materials are available in construction? It is mainly straw, clay, wood, stone, hemp chaff, hay, lime, mushrooms and mushroom materials, vegan kombucha leather, pineapple, linen, hemp, etc.

CLAY

Clay can often be found at the investment site. In Albania clay is a common and accessible material. It is often mined for the purpose of creating bricks. You can buy it in brickyards or in nearby mines. It can also be dug from under the foundations of a newly erected building. Clay is a healthy, cheap, local and virtually zero / low emission

(CO2) material for the sourcing process. Importantly, it can be reused so its remnants waste is not actual waste but a valuable raw material. It is environmentally friendly and friendly to us. In addition, the properties of clay (heat accumulation) create a healthy environment inside the building, regulate the temperature and positively control the humidity. Working with it is intuitive and safe for workers. Clay can be used as a plaster, as a filler for wooden walls with straw chopped or in the form of green bricks (Wattle & daub).

It is wonderfully suitable for creating natural floors (earthen floors). It can also become a construction material (rammed earth). With the help of clay, you can also create a beautiful oven for baking pizza and bread. It can also be used to fill walls with tires (earthship).

STRAW

Straw is the dry stalks of threshed grain and is very local material in all over Albania and Europe. Less energy is needed for its production and transport than for processed materials, some sources say the CO_2 emission factor for straw is negative, so it gives a great material, very low environmental footprint (only for transport from the fields). Straw has very good thermal and acoustic insulation properties due to air chambers in a blade of straw constrictions. According to the German technical approval, straw cubes have the following thermal conductivity values: $\lambda = 0.080$ W / (m K) along the stems, $\lambda = 0.052$ W / (m K) across the stems. Straw is also a vapor-permeable material, which allows you to create diffusion-open buildings, beneficial to our health (in combination with natural plaster or wooden elevation).

It is a renewable material (it grows every year). This way, we can save wood which grows slower. It is also a biodegradable material (it is not waste but an important element in a cycle of life). What is important is the fact that straw decomposes slowly due to the high silicate content so it is perfect for construction. It is durable. For constrictions wheat, spelled and rye straw cubes are mainly suitable. Though the quality of the straw matters a lot. What should the straw bales be like?

Straw bales used in construction must have the following properties:

- as small as possible rounding at the ends;
- stems as intact as possible;
- golden yellow color (not gray or black);
- no musty smell;
- uniform structure, firm bonding and compression;
- relative air humidity in cubes less than 75% - (0.13 g/g mold)

Many people who think of straw as a building material have many concerns about its fire resistance. Below are the results of tests carried out in Europe, which show that a plastered straw wall is quite fire resistant and safe. These parameters are surprisingly good and comparable with those of brick houses.

Fire resistance of strawbale wall (straw cubes plastered with clay):

- F30 according to DIN 4102 - for a supporting wall made of straw cubes, loaded and covered, 3-5 cm thick clay plaster
- F30 according to DIN 4102 - for a supporting wall made of straw cubes, loaded and covered, a layer of clay 1 cm thick
- F90 - 90-minute fire resistance for a non-load-bearing wall covered with plaster clay 3-5 cm thick
- Building material class (SBI) B1 (flame retardant) according to EN 13501 with a layer 8 mm thick clay scratches.

The only dangerous thing on the construction site is loose, un-plastered straw, therefore straw should be slurred with clay (initial plaster layer) as soon as possible. Building with straw is as safe as possible while maintaining safety and health rules. Another concern is moisture and the mouse. For the building to be healthy and warm straw must be dry so there are no water installations in the straw walls. Also, a tight roof is important. A building constructed in this way will be durable and warm. In order to protect from grazing, in the case of natural building a protective mesh should be embedded in the plaster in the lower parts of the wall and in the eaves (in places of ventilation exits) and plaster should be carefully applied.

WOOD

Wood is a material available in Europe, most often found locally. Wood has been used as a building material for centuries. It is not only an ecological, natural material, but also it does not contain any harmful compounds and its structure and color are beautiful. Traditionally, wood was used in the form of stripped logs, from which walls and the roof were erected. The so-called buildings made of logs or in the form of a frame are finished with boards or plaster. Currently wood is most often used to create roof structures (roof trusses) and frame of buildings in the so-called Canadian system.

Wood is a vapor-permeable (breathable) material, which is beneficial for building healthy interiors (building open to diffusion). Due to the high specific heat, a wall made of wood stores thermal energy as well as a wall made of concrete, brick or silicate, which are much heavier than wooden one. Wood is also a material that has a high tensile strength. It is a fairly good insulator, but its lambda is too weak to meet the current EU requirements for thermal insulation under the current standards and wall thickness (to meet the requirements, the wall should have a thickness of approx. 78 cm). That is why modern wooden structures are often warmed up.

Due to the limited number of old trees with large cross-sections, they are required in log and partly skeletal technologies. Prefabricated wall and ceiling elements composed of small wooden elements, glued or joined into large structures with adhesives or tenons are increasingly used. Wooden ones without the use of adhesives. These types of structures made in accordance with the art, are durable, warm and quiet and have greater strength than solid wood.

Wood parameters:

- λ [W / (m • K)] = 0.16-0.30
- Specific heat 2.51 (kJ / kg * K)
- For a 78cm wall, U = 0.2
- Water vapor permeability = 60 – 320

Natural Building Technology

In order to leave as little ecological footprint as possible during the construction and while residing the building (care for the Earth) but also to keep the building healthy and warm for us (care for people) it is worth using one of the techniques of modern natural construction and creating positive connections with the environment. Natural buildings are biodegradable after their period of use (if they are well made, they are very durable) and return to the ground which is very important in a world where construction waste constitutes 1/3 of all the rubbish that floods us (use your resources wisely).

In addition, it is also worth mentioning that from the environmental point of view, it is very beneficial to use renewable and biodegradable materials and to use recycling and upcycling in construction, for example the use of materials from waste. Upcycling is currently a strong trend in niche architecture focused on environmental and climate protection. It can easily regenerate damaged areas with the use of old furniture and structures to create new qualities, new interiors and buildings. These are the most advisable behaviors, as well as the optimization of your own needs.

Technologies with the Use of Straw

The straw in the building can be used as a self-supporting material (straw bale loadbearing) - construction of the walls or as a filling material - insulation of walls with a wooden frame structure. In the wooden skeleton, straw can be in the form of strawbales or mix of clay with straw or adobe - prefabricated, sun-dried straw-clay bricks.

Some History

The very idea of a supporting structure made of straw cubes began with the invention of dice makers in the late nineteenth century. Farmers in the American state of Nebraska, where there was very little wood, invented the construction of straw cubes stacked like bricks, initially to create shelters and barns, and later also houses. Hence a self-supporting style is often referred to as "Nebraska". Some of the first houses still exist and are doing well, the oldest one was built in 1903. As can be seen, a properly constructed house made of strawbale technology is very durable. This technology was forgotten after the war due to the growing popularity of cement. It was rediscovered by the pioneers of modern natural construction in the 1970s.

Strawbale Loadbearing

A supporting structure made of straw cubes is the purest construction strawbale technique in which compressed straw cubes are a building material of the walls. They are load-bearing (they carry the weight of the roof, or possibly higher floors) and in addition to stiffening (in the form of e.g. wooden or metal pins) and window and door frames there are no other load-bearing elements, which reduces the consumption of wood.

The walls rest on a foundation, most often wooden one. There is a wooden garland on which the roof structure or the upper store rests on the wall made of straw cubes. The straw is additionally compressed with belts. The stiffness of the structure is also added by plasters (natural, of course). In our climate it is most often a lime plaster on the outside and clay inside.

Walls made of loadbearing are continuous in their structure, and thus - warmer and quieter. There are also fewer joints, thermal bridges and places that are difficult to fill with straw. In addition, they are very resistant to earthquakes, so it is recommended to construct them in areas of seismic activity. It is easy to construct with straw cubes since they are stacked on top of each other and then compressed. It doesn't require that much skill compared to other technologies. The advantage of using this method is also saving the wood and thus the construction costs should be lower. The main material of walls is straw, which is a poorly processed and renewable material. What is more difficult in this technology is keeping the walls dry during the construction, because straw is a load-bearing element and until the walls are made there is no support for the roof that protects against rain, a temporary cover has to be erected. It is then recommended to use hybrid technology or build scaffolding for a temporary roof structure. It is also harder to obtain the stability of the structure before the walls are stressed and the plaster is not applied. Wall compression makes the details of windows and doors more difficult and… crucial. Loadbearing buildings have also their own design requirements, for example simple forms are preferable, windows and doors are avoided in the corners in order not to weaken the structure. It is then crucial to protect the walls from moisture so larger eaves are preferred and straw cubes in the wall structure should start minimum 20-30 cm above ground level. Nevertheless, the availability of straw, its price compared to wood and the fact that it's an easily renewable material (straw grows every year) make it a very attractive technology.

Strawbale Post and Beam

The most popular strawbale building technology in Europe is currently a skeleton structure (also known as Post and Beam or In-Fill) in which a skeleton is made of wood (most often) and it is a load-bearing element while straw remains the filling and insulation of the structure. This method is popular because of load-bearing wooden structure that is easy to calculate loads. There are many professionals who can make it so there is no big risk in experimenting as the structure is stable and predictable. The roof can also be made before filling the walls, which is a great solution. Unfortunately, the disadvantage of this technology is that the straw as filling touches the wood in many places and these places are problematic - it is harder to fill these gaps properly. The weight of the structure itself is greater and it is impossible to use systems of simple point foundations here. In this technology more wood is used, which is more expensive at the same time and not that easily renewable as straw. Also, a qualified construction team is most often needed to erect a complex wooden structure. With straw, or other natural materials, you could isolate as well existing building.

Natural Technologies of Building from Wood

Wood can be used to create a traditional fully wooden structure (log buildings) or in the form of a skeleton (frame building) which can then be filled with other natural materials (straw, clay, hemp chaff, green bricks). Technologies made of a small log insulated inside (log width 6-12 cm, insulation and formwork in the middle) are also popular in Europe. In construction in places where larger cross-sections or high precision and strength are required, glued wood is also used, e.g. KVH (it uses full-value, large wood, joined with glue) or BSH (wood made of small wooden lamellas, joined with melamine glues). Glued wood has lower deformability and better strength than solid wood.

Currently, the so-called **MASS TIMBER (ENGINEERED WOOD)** prefabricated wooden panel structures are increasingly common. Technology of Mass Timber is promising for the future. This technology uses pieces of wood (as opposed to Timber Frame or log houses), which allows the use of trees with smaller sections and saves valuable old forests, which are an important element of the ecosystem. Therefore, such elements are easy to mass produce many methods and systems, and wood resources are more accessible.

Examples of Massive Structures:

Thoma Holz 100 - glue-free walls built from smaller pieces - Basically, the walls of a Holz100 house are set up in the same way as any glued wooden elements. The cross and diagonal arrangement of the plank layers create one compact structural system. The groundbreaking Thoma technology is the fastening material: only wooden dowels are used. Vertical and horizontal boards and square timber are arranged in such a way to form compact building elements without any gaps. Carefully designed grid of wooden dowels passes through successive layers along the entire thickness of the wall. The pegs in the new place absorb the residual moisture of the wood and swell, joining the individual parts into one solid, durable whole.

MHM (Massive Holtz Mauer) - is a massive dry solid wood wall element which is completely free of glue and chemical compounds. Its physical and biological properties ensure constructions with excellent quality. MHM panels are made of grooved timber layers. The objective of the grooves is to achieve better thermal and sound insulation of the structure with the help of air accumulating in the grooves and furthermore the structure will dry rapidly in the event of water damage. Crosswise fixing with aluminum nails ensures a very stable and strong structure. Only technically dried timber is used for production to protect wooden structures from pests. The uniform and stable structure of MHM® panels provides plenty of options for use.

CLT - cross laminated-timber - are multi-format, structural cross-laminated timber panels made of 100% solid wood. Therefore, they can be used to erect walls, ceilings and roofs in a short time. They are made of dried spruce lamellas arranged in layers with individual layers staggered to each other by an angle of 90°. The number of layers can vary and the final thickness of the panel is thus determined. The panels are glued.

Fire Resistance

The fire tests confirmed that mass timber structures meet and generally exceed the fire resistance requirements in the current code, it passes 3 hours easily. Covered with gypsum board or clay plaster - almost totally fire resistant.

Charred on the outside, fire does not damage the structure, like burning a log - very long time, because the elements are massive (mass timber). Mass timber has high precision in the factory, high safety on site. It is strong and durable. Replacing steel with mass timber would reduce carbon dioxide emissions by between 15% to 20%. By some estimations, the near-term use of CLT and other emerging wood technologies in 7 to 15-storey buildings could have the same emissions control effect as taking more than 2 million cars off the road for one year. Studies have shown that building with wood produces fewer greenhouse gas emissions than building with other materials. Mass timber buildings weigh approximately 1/5 in comparison to concrete buildings. It reduces their foundation size, inertial seismic forces and embodied energy, it works really well in seismic zones.

Knowledge Transfer and Sharing

Knowledge Transfer and Sharing

Training Concept of Construction

The essence of the training was to show the wider community, often with no prior experience in the construction so far, that it is possible to build with your own hands in a healthy, natural and environmentally friendly way. An important element of the training is pro-environmental education, for example explaining why we use natural materials. Working together gives the opportunity to talk about the kind of the world we want to build and what the climate dangers are if we do not switch to green technologies.

It is important to emphasize that this is more than just going back to basics. Often such a return is badly associated with a return to a mud hut, with no bathroom or amenities, instead of a modern home. Natural technologies do not exclude modernity, the search for a modern form adequate to the aesthetics of the times we live in, technological improvement for example prefabrication of elements, enabling much faster construction time and greater precision. In this trend of construction, both small but comfortable homes and large facilities with intelligent systems can be created.

The training concept assumed the division of work into several stages:

IDEA

The team of experts consisted of architects and builders. According to these specializations, the architects were responsible for the design stage, the builders were to ensure the proper selection of elements and details of the technology.

An important element in the search for technology, form and function was the contribution of the Albanian side. Working out the idea required getting to know vernacular architecture and locally available materials. During online meetings and training series, the context was drawn. However, it was only the visit on site that made it possible to refine the project. It was necessary to get to know the plot, look at possible view openings, the trajectory of the sun, talk with future users and get to know the needs of the place and recipients in more detail.

Before arriving, one of several projects presented online was selected and combined with other elements from the rest of the projects, possible to be incorporated.

Designing online in a group has its limitations. That is why, a full elaboration of the design and agreeing all the details with contractors took place during a live workshop that lasted several hours. In a group, during lively discussion on drawings, with the possibility of sketching, it was much easier to come up with a good project.

PREPARATION OF THE CONSTRUCTION SITE

The works on the preparation of the construction site included:

- ➔ the exact location of the pavilion
- ➔ storage of materials:

- ➔ wood,
- ➔ straw cubes,
- ➔ clay,
- ➔ sand,
- ➔ describing wooden elements (dimensions and function),
- ➔ preparation of tools.

THE TOOLS TO BE USED ARE:

- handsaws,
- screwdrivers / drills,
- hand mortar mixer,
- small buckets,
- large buckets,
- mason ladles,
- floats for patch,
- hammers,
- measuring tapes,
- eight-angles,
- level,
- pencils.

CONSTRUCTION

This stage of work is usually the most complicated, requiring experience, physical strength and good knowledge of tools. It is assumed that these activities should not be left in the hands of inexperienced volunteers or workshop participants.

There is the greatest risk of injury with tools, falling or being crushed by a heavier element. Besides, this stage must be really well done for the structure to be stable and so that the next stages can be carried out without major problems.

It is the time of observation for the workshop participants and only after a few experiences of this kind and mastering the work with power tools they can actively participate, of course, under the supervision of a specialist.

SUB-CONSTRUCTION

The elements of the substructure are no longer heavy or as complicated as the structure, and there is a possibility to participate in the workshop after being presented with the rules and how to use the tools.

Elements of the substructure are created during the workshops. These are for example wooden frames for straw panels, floor substructure or roofing.

MATERIALS OTHER THAN STRUCTURES AND FINISHES

At this stage, materials such as planking for the floor or straw cubes to fill the panels are used.

Working with natural materials is fun and easy to learn. Stuffing straw cubes or applying successive layers of clay plaster can be done by people of different ages. Even short experience gives some glimpse to an efficiency, a feeling that you can build with your own hands. Natural materials do not stain permanently, their smell evokes the memory of a meadow, field or forest.

CONSTRUCTION STEP BY STEP:

0. Preparation of wooden elements: cutting to the appropriate size:

Tools used: handsaw, petrol saw

1. Screwing the pavilion base (frame under the floor) from perpendicular edge beams using angle brackets

Tools used: drill (drilling holes), screws

2. Screwing additional beams supporting the wall where the strawbale panels will be placed and additional beams every 60 cm perpendicular to the floorboards, as a floor support (4 pieces)

Tools used: drill (drilling holes), screws

3. Positioning the base on wooden blocks to align the levels (with a spirit level)

Tools used: spirit level

4. Preparing wooden frames for prefabricated panels by squared timber

Tools used: screwdriver + screws

5. Producing prefabricated elements:

- putting the straw blocks into the wooden frame
- compression by pressing the straw from above and adding timber profile
- fastening of the prefabricated element with a belt

- putting another block of straw into the wooden frame
- compression by pressing the straw from above and adding timber profile
- removing the upper timber profile from the frame, compressing the straw bale and screwing again the upper square timber
- production of 4 prefabricated elements using the above method

Tools used: screwdriver + screws, assembly belts

6. Assembling prefabricated elements:

- positioning prefabricated elements on the frame and screwing to the frame

Tools used: screwdriver + screws

7. Installing poles and the upper frame:

- screwing the column to one of the sides of each prefabricated element
- aligning the prefabricated element and the column
- screwing the beams of the upper frame to the columns

Tools used: drill (drilling holes), screws, screwdriver + screws, spirit level

8. Installing the roof substructure:

- screwing the beams parallel to one of the sides at a distance of about 60 cm
- screwing the shading wooden profiles on top of the structure
- cutting

Tools used: drill (making holes), screws, drill driver + screws, hand saw

9. Making the "window of truth":

- assembling a recycled window to the wooden profile of the prefabricated element, allowing to leave a fragment of a non-plastered wall so that you can see the material used in the panel - straw

10. Installing the floor:

- screwing and cutting to size floorboards

11. Preparing the base plaster:

- mixing clay, sand, water and straw

Tools used: buckets, electric drill + paddle mixer

12. Applying plaster:

- applying successive layers by manually imposing the plaster mix on the prefabricated elements

Tools used: buckets

13. Preparing the base plaster:

- mixing clay, sand, water and a small amount of straw

Tools used: buckets, electric drill + paddle mixer

14. Applying top plaster:

- applying layers by manually imposing the plaster mixture on the prefabricated elements and leveling with a trowel

Tools used: buckets, float

15. Installing plexiglass protecting the straw walls from above:

- screwing the plexiglass panels

Tools used: drill (drilling holes), screwdriver + screws, handsaw

Exchange of Know-how among Professionals

A valuable experience of working in an international team of experts offers the possibility of knowledge transfer. One of the elements of the joint work were talks about the situation on the market and ongoing projects and constructions. We compared the methods of prefabrication in Poland, the Czech Republic and Slovakia, the secrets of good plastering. We considered the durability of materials and the method of protection against weather conditions, comparing experiences from a similar climate zone in Central and Eastern Europe.
We had the opportunity to compare legal regulations and restrictions on the use of natural technologies.
The experiences in the Czech Republic, Poland and Slovakia are slightly different from one another but relate to similar realities.
The workshop in Albania gave the opportunity to present the path followed by the above-mentioned countries in developing the use of natural technologies, presenting possible paths of education, legislation, as well as benefits and limitations.

Project Ideas Developed

PROJECT 1

Jan Dowgiałło

A small pavilion made of wood and compressed straw.

function - pergola, bike stand, possibly a swing

location - both places are good

materials - straw bales, wooden planks, plywood, transport straps:

OPTION1 - GREEN ROOF (long lasting, more work and money)

OPTION2 - NO ROOF (simple, easy, temporary-natural decomposition)

MATERIALS

- STRAWALES X70
- 10M TRANSPORT BELTS X12
- WOOD ~ 4X12 ~ 400 RUNNING METERS
- SCREWS
- NAILS

TOOLS

- CIRCULAR SAW
- HANDSAW
- ELECTRIC SCREWDRIVER
- POWERDRILL
- 2-3 HAMMERS
- PLIERS
- CONSTRUCTION LEVEL
- PENCILS

PROJECT 2

Magdalena Górska

Small pavilion with a green roof as exhibition place and meeting point.

We have three exhibition walls. On each we will have from inside the “windows of truth” of size 1x2m and information board. The rest will be plastered or covered with OSB board.

Wall filled in using different techniques of natural design: strawbale, adobe, hempcrete or cordwood. If we don’t have time to plaster everything, we can cover outside of the wall (from outside) with ECO OSB and from the inside with plexiglass.

It will be safe from wind and humidity and durable. What should be prepared before workshops:

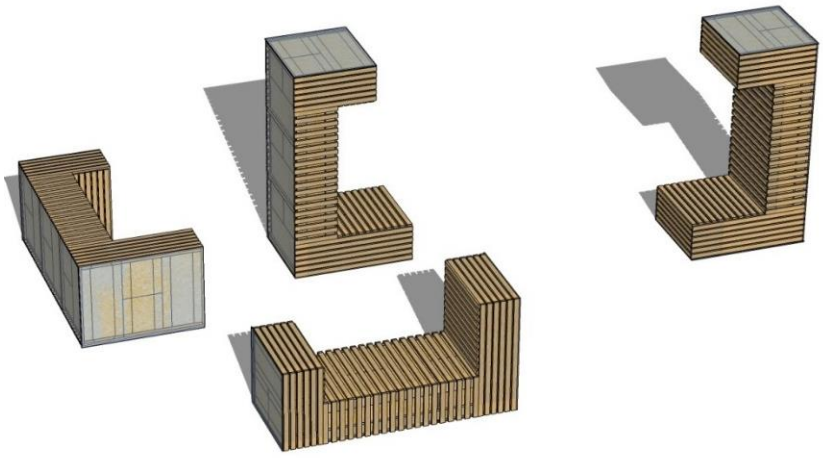
- foundations
- post
- main constructions of the roof

MATERIALS

- 8x WOOD POSTS - 16x16x230cm
- 8x POINT FOUNDATIONS (concrete or metal screw)
- 16x6cm WOOD FOR ROOF CONSTRUCTION
- OSB eco - 14m2
- EPDM MEMBRANE - 18m2
- METAL FINISHING – METAL PLATE 15cm, 13,6mb
- STRAWBALE - ok. 40,
- SCREWS -
- CLAY - 4 bags
- SAND - 4 bags
- LIME FOR MORTAR - 4 bags
- WATER
- (fountain - bricks - 100)
- PLEXI GLASS - 6m2

PROJECT 3

Magdalena Górska



BENCH - one shape - a lot of orientations and configurations. From two sides covered with plexiglass - showing technique of natural building - bench as a form of exposition. From other sides - protected with wood planks and eco OSB. Can be filled with different techniques of natural design, strawbale, adobe, stone, hempcrete.

It would be durable because the materials inside will be covered –

they will not have direct connection with outside (covered with plexiglass or wood boards). In each position of the bench, we see plexiglass that show us details of the inside filled with straw or other natural materials. It would be great in a city place, to play with configurations to create an interesting public area and at the same time - promoting natural materials - exhibitions.

MATERIALS (One bench)

- 8x3cm WOOD PLANKS - 20mb
- SMALL PLANKS 2x1.5 - 60mb
- PLASTIC GLASS - 3m2
- OSB eco - 5m2
- STRAWBALE - app. 9
- SCREWS
- CLAY – 1.5 bag
- SAND – 1.5 bag
- WATER

PROJECT 4

Katarina Kierulf

A small pavilion with 3 walls & a simple thin metal roof – designed as long-lasting.

2 walls could be filled with straw-bales (cut-system) fixated between wooden pillars

1 wall could be a clay wall or 2 walls clay & 1 straw or 1 straw, 1 clay & 1 another type

In this way, the participants would learn real building techniques. The group that will be working with clay could explain how to plaster. This could be done later by locals.

1st day - wooden construction, 2nd & 3rd day infill-workshop days.

PROJECT 5

Anna Zawadzka

A small pavilion 2.5x2.5x2.5m with two benches.

Both locations are possible. If the pavilion is seen from above the green roof can be used.

The structure doesn't require foundations.

The simplest version has a shading roof, which also protects materials samples.

The main idea is to show different samples of natural materials, depending on what we have: straw, straw and clay, stone, different clay, hemp, green wall etc.

MATERIALS

- WOOD 12X12X250 CM, 10 PIECES
- benches:
- WOOD 12X12X250 CM, 4 PIECES
- WOOD 12X12X50 CM, 8 PIECES
- shading:
- WOOD 4X4X250 CM, 32 PIECES
- WOOD 4X4X60 CM, 64 PIECES
- natural materials for the samples
- STRAWBALE 45X45X70, 1 PIECE OR JUST STRAW
- CLAY, DIFFERENT COLORS
- POSSIBLY SOME OTHER NATURAL MATERIALS - HEMP, LIME
- wood for the samples for the samples
- WOOD 6X12X225 CM, 4 PIECES
- WOOD 6X6X52 CM, 10 PIECES
- PLYWOOD 52X52X1, 10 PIECES
- SCREWS
- NAILS

TOOLS

- CIRCULAR SAW
- HANDSAW
- ELECTRIC SCREWDRIVER
- POWERDRILL
- 2-3 HAMMERS
- CONSTRUCTION LEVEL
- PENCILS

Engagement and Development

Engagement and Development

Final Construction Training Project

The project that was finally built was created on the basis of Katarina Kieruf's concept with the participation and contribution of the entire team. The pavilion chosen for the construction was to be a showcase for natural technologies, a meeting place and a place for exhibitions at the same time. The pavilion with a partially suspended roof from Katerina's initial concept has been converted into a pavilion with a fully supported roof so that it can be easily and safely constructed. The size of the pavilion was also reduced so that it could be completed within 4 days of construction.

The wooden structure was chosen as the structure that would be filled with wooden panels filled with straw cubes which were later tightly plastered with clay. The clay protects the straw against fire, moisture and sun. A straw-wood panel was used in every other field in the wall turned by 90 degrees towards each other. This created a picturesque, interesting effect that gives a sense of both accessibility from all sides and protection from the sun at the same time. Free spaces were filled with a brace which strengthens and stiffens the wooden structure. The layout of the panels and free spaces were also coordinated with the school principal's requirements for visibility and accessibility.

The pavilion's roof is made of small beams, so that it provides shade on sunny days, but at the same time does not act as a barrier to a hot air and can create an impression of openness towards the sky. The openwork roof can be also used as a scaffolding for green vines. The floor is made out of wooden boards. The straw panels in the walls were plastered with clay and covered on the roof with plexiglass plates thanks to which they will be protected against rain and will be more durable.

In the center of the pavilion a **“window of truth”** was situated - a wooden frame with recycled glass found next to the garbage cans, which shows the straw inside of the panel, as the main material, the walls were made of.

The whole structure is painted with natural linseed oil which protects it from the rain as a natural impregnation and gives a beautiful, complemented color.

The whole thing gives the impression of an amazing play of lights and fun. It is modern and cozy at the same time, its scale is adapted to the size of the audience, children. Natural materials add coziness and warmth.

Adaptation and Functionality

The pavilion plays an educational role for the purpose of spreading knowledge of natural construction, environmentally responsible attitudes and positive behavior towards the environment. It is also a great place for exhibitions and happenings. It can serve as a stage for theatrical performances, located in a courtyard where it is surrounded from two sides by a large space and stairs ideal for the audience. Placing it in school gives the possibility to be used by children as a meeting place, for drawing workshops or any other type of educational and fun activity. It can also be a place where children learn natural plastering, play with plaster colors and paint over it with natural paints. The original assumption was that the students would be able to decorate the pavilion with elements they like and give it a more childish character, e.g. with mussels, pebbles, drawings.

Training on the Use of Natural Materials for Youth and Children

The construction of the pavilion at school gave the opportunity to involve children and teenagers in the process of creating the final effect of the project. From the very beginning children watched the progress of the construction process and were noticeably curious and excited by the fact that it was being built in their school. All the time someone came, peeked and asked questions. Children and students from the school also took an active part in creating the elements of the pavilion, their contribution is invaluable. Young children of the first grades were mainly engaged in plastering. Older children, teenagers and students, helped with the construction of

walls, creating panels. A group of very active boys also helped to build practically the entire floor of the pavilion from wooden boards. On this occasion they learned how to use power tools and a saw. Everything took place under the supervision of experts in a safe and stress-free manner. Volunteers from the university also took part in the construction of the pavilion. Their contribution was made at virtually every stage of implementation.

A beautiful gesture in the whole process was the initiative of an art teacher who conducted classes of painting the pavilion with children during its construction outdoors as part of outdoor activities. These incredibly high standard paintings were later displayed as part of an exhibition on the wall of the school. It was quite a touching experience for the experts as each one of them found themselves in the children's drawings.

The construction of the pavilion at the school contributed to the popularization of knowledge of the climate and responsible behavior as well as of natural construction among children and adolescents. Everything took place in the atmosphere of fun.

Sustainability and Further Use

Further Use of the Training Structure

The pavilion was designed in the courtyard of the school, a very sunny, empty square made of concrete cubes with a few trees giving a little shadow and a few concrete benches placed under the fence in a way that does not favor interaction between students.

The pavilion is to function as a semi-private, semi-open space, conducive to integration in the group or conducting outdoor activities. Wood and clay give a pleasant feeling of being close to nature, it helps to calm down and relax. You can add chairs in the pavilion, you can also use a wooden floor or cushions placed on it as a place to sit. At the same time, this space is safe, the openings of each wall provide an overview from all sides and prevent dangerous or violent situations.

The facility has also an educational function. One can conduct classes or ecological talks there, showing students different possibilities and paths than one that surrounds them on a daily basis. Most live-in houses or concrete blocks and perhaps the pavilion will be the first contact with other types of materials and thinking about building.

Further Maintenance and Application of Materials by Youth

Workshops

Natural materials require care over time. The applied plasters should be maintained and corrected when scratches or losses appear or if they are washed away by rainwater. This necessity to take care of the building represents a good basis to conduct workshops and familiarize young people who did not participate in the construction of the pavilion with natural materials.

These jobs are simple and do not require extensive knowledge of technology.

It is important to protect some of the clay after the workshop for later corrections.

Corrections should be made as follows:

- preparing a mixture of clay, sand and water to obtain an easily applicable mixture
- ingredients should be mixed in containers using a mixer
- then they should be separated into smaller buckets for participants
- in places of scratches, apply a small amount of plaster, the remaining plaster can be rubbed off with a sponge to even out the surfaces
- the walls should be leveled with a trowel

It is possible to make some patterns, using for example a spatula or placing small decorations, for example seashells.

Before starting works, protect the floor with the foil and after applying the plaster scrape it off with a spatula. Wash off any dirt on the structure with a sponge.

Tools necessary to conduct the workshop:

- hand mortar mixer,
- small buckets,
- large buckets,
- floats for patch.

Lessons Learned and Recommendations

Lessons Learned and Recommendations

Education and values

Nowadays, in the face of the climate crisis and the progressive loss of biodiversity, it is necessary to take immediate action, even small ones while contributing to a greater change. Such activities include initiatives like Build Back Better project. It contained three diverse actions. It resulted in a three-day online course, construction of a small pavilion and hereby publication.

All these steps are aimed at reaching a larger group of recipients and familiarizing them with the idea of natural building. And though it may seem as a step back, it is rather a return to long-abandoned materials and technology. This is the result of a series of analysis and a search for a remedy for the global environmental situation.

The construction sector is responsible for 30-40% of total global greenhouse gas emissions. It uses 3 billion tons of raw materials each year which corresponds to about 40-50% of total demand for raw materials and construction-related energy consumption which exceeds 40% of global supply.

Technological changes that have occurred in the construction sector since the mid-twentieth century have significantly shortened construction time. The side effect of this process is that more energy is required for the material itself, more waste is generated, which actually means shifting the costs of material disposal to subsequent generations. The construction sector is now largely based on an infinite linear model. Meanwhile,

the resources (even cement sand) are finite and the planet's ability to absorb waste and emissions has its limit followed by a climate catastrophe.

The use of raw materials in construction, such as straw, clay, hemp or other raw materials with low built-in energy, natural or recycled will significantly contribute to counteracting climate change by:

- reduction of CO2 emissions generated during the production of, among others steel, cement, fired ceramics, insulating materials by reducing the energy consumption of technological processes,
- popularization of natural raw materials and materials not based on derivatives of industry related to the exploitation and use of fossil fuels (for example gypsum - waste from heat and power plants, polystyrene - a derivative of crude oil),
- reduction of CO2 emissions during transport - natural resources can be obtained and processed locally; negative carbon footprint in the environment - in the growing phase cereals absorb carbon dioxide - while in the production of typical thermal insulation materials, such as polystyrene or mineral wool, pollutants are emitted,
- reducing the amount of technological waste generated during the production process of building materials,
- reducing the amount of energy necessary for the operation of buildings during their use; biodegradability of building materials.

Buildings in natural technologies can be simpler than they used to be under construction thanks to the implementation of achievements such as prefabrication and modularity, structure optimization. Objects erected using these technologies can be constructed as quickly as buildings made of highly processed raw materials.

A residential house built of prefabricated timber and straw (such as a show pavilion in the school yard) can be assembled on site in a matter of days. Prefabricated products can be manufactured in a few weeks using basic tools, as demonstrated during the workshop.

It is important to emphasize that going back to natural materials is not going back in time. It is a significant step in the development of circular economy which is a must. Natural technologies are low-emission and the materials and buildings made of them are biodegradable. They are an alternative to construction based on brick technology using, inter alia, cement, steel, fired bricks, polystyrene or petroleum materials, the production of which is based on the use of minerals and thermal emission treatment. They are based on locally available and low-processed materials (e.g., straw is a by-product of agricultural production, it is a renewable raw material) using manufacturing techniques based on human labor, without excessive use of energy-consuming, expensive and complicated devices. They allow for engaging future residents and

entire communities engaging in the process of building thus increasing its resilience to crises.

Social Perspective and Promotion of Friendly Environment

An important element of the entire process in the Build Back Better project was the participation of the local community. During the online course, we had the opportunity to meet mainly with professionals, while during the construction: with young people, students, school employees and professionals.

The construction of the pavilion was a perfect occasion for visits of the officials and local authorities, including Mayor of Durrës Municipality and Ambassador of Czech Republic in Albania, representing Visegrad International Fund, and talks about climate crisis and the response to it, which can be found in natural technologies. The visits followed their presence and the presence of other high officials from Durrës Municipality and Embassy of Czech Republic in Albania in the online training.

Working together and involving people with no previous experience in the construction has proven that within the usage of such materials it is possible and what's more pleasant integrating a group working together.

Natural construction makes it possible for future residents to carry out most of the work without complications. Natural construction lowers the overall costs, provides the necessary hands for work, but also creates a bond between future users and their space. It gives efficiency because even in the face of a cataclysm (and unforeseen and violent weather phenomena, climate disturbances are an element accompanying the climate crisis) they can rebuild houses with your own hands and obtain materials cheaply and locally.

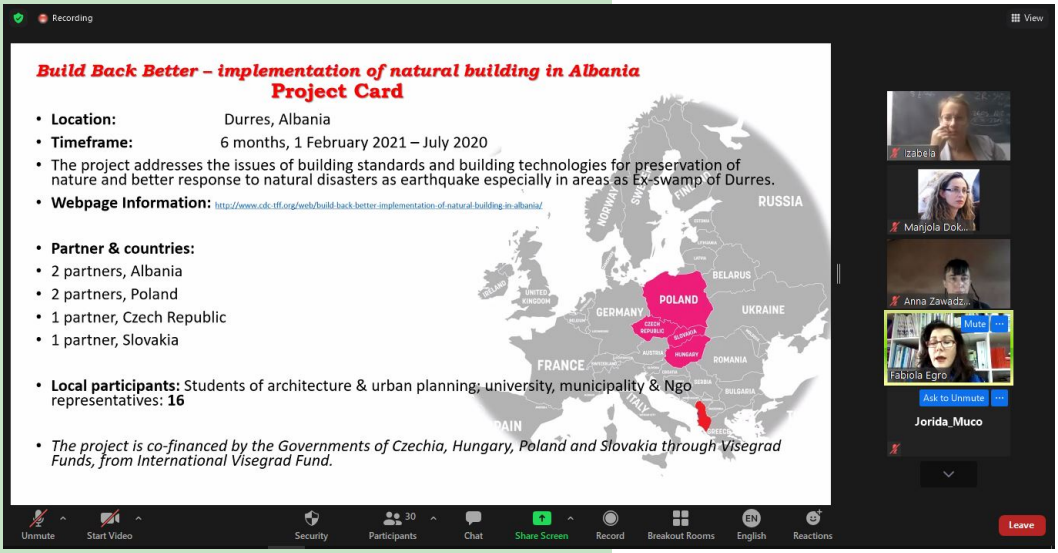
The climate crisis is still insufficiently present in public discourse or teaching. Education is highly needed for a quick change of habits and an understanding the dramatic nature of the situation. Such meetings as a joint workshop remain in the memory of the participants for longer. They are also sometimes the initial moment of contact with ecology and an area for a deeper reflection in this matter.

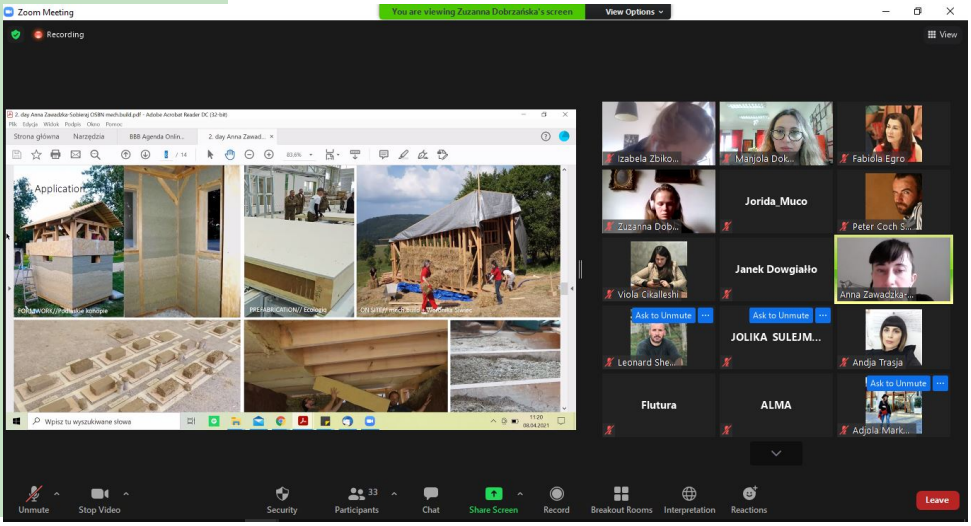
Online course

Online course was primarily used to exchange knowledge between experts from Poland, the Czech Republic, Slovakia and Albania.

It also contributed positively to the further steps of the project. Without knowing the context, local conditions, building tradition and available materials it would have been difficult to plan the construction of a demonstration facility.

The trainings constituted a mutual exchange of knowledge - foreign experts could learn as much as possible about the conditions in Albania, thanks to cross-sectional presentations showing local architecture, city of Durrës and potential plots. Experts on the next two days presented a cross-sectional spectrum of natural construction possibilities. During a joint discussion, it was also possible to select those technologies that are the most adequate and possible to use. The third day was dedicated to the exchange of ideas for the object itself. Design ideas were developed individually by experts, and then confronted and analyzed during subsequent online meetings.





Experience

Sharing

“Beyond Borders”

Experience Sharing Beyond Borders

Build Back Better project as an international project was an excellent opportunity to exchange knowledge among project participants from several European countries. Experts from Poland, Slovakia, the Czech Republic and Albania could exchange their experience regarding good practices in natural construction and show, in the Albanian context, that these technologies are available and applicable. After all, there are both clay and straw in large amounts.

Part of the project was an online specialized training, where experts shared their knowledge and experience. The training is made publicly available on social media, thanks to which this knowledge will be shared with the broad international community. Hereby publication is also be made available for free and widely, both in the participating countries and internationally. This will enable a wider promotion of environmentally responsible solutions and natural building. The construction of the pavilion will also be published in architectural magazines, e.g. in Poland, as a great example of cooperation and implementation of a socially oriented project.

The project, which is dedicated to the territory of Albania - thanks to these elements - will have a wide impact abroad, as well as contribute to spreading knowledge about of natural construction techniques throughout Europe. The implementation of the project was a high-level professional experience and great fun, an example of beautiful cooperation. We hope that this project was a pilot project for Albania, where experts could get to know each other and make friends with the local community and that it will result in interesting implementations and trainings.

Bios of the Experts

Viktor Karlík

BAOBABY, the Czech Republic

Viktor Karlík - the main coordinator of the organization BAOBABY, whose main mission is the promotion and innovation of natural building in the Czech Republic.

He builds straw houses and natural playgrounds. He is a lecturer at BAOBABY courses. He is the main organizer of BAOBABYFEST and Natural Homes Conference. Last year, he and his team developed a system of straw panels.

Peter Coch Shaman

Organica, Slovakia

"I am always looking for the natural way to build and live."

Working with natural building materials for 16 years, last 10 as professional and self-employed craftsman. He is an expert in clay and clay techniques in natural buildings - clay plastering, preparation of clay from local sources, cob, earth bricks, earth ovens. Working also with lime and natural insulations on new and reconstructed houses. He is a leader of NGO Organica Slovakia, creating a big network full of different craftsmen and building professions to meet the requirements of customers all over Slovakia. Loves photography, which he uses as the propagation tool to promote natural building lifestyle to a wide audience on websites, conferences and social media.

Magdalena Górska

OSBN, eKodama, Poland

"I am a designer and activist who has been active in the field of natural design and permaculture for almost ten years. I create natural places, interiors, larger assumptions from natural, low-processed materials and materials from recycling, upcycling." Architect, educator, activist, founder and member of the Polish Natural Building Association (OSBN, 2014-2016 OSBN vice president) and Polish Chamber of Architects. Originator and co-founder of Polish Festival of Natural Buildings and Design. Founder of Educational Centre for Natural Design and Permaculture "Permakulturowy zakręt" and creator of Summer School of Natural Design (5 seasons). Winner of many awards, incl. the main prize of the Polish Association of Architects 2020 and the World Architecture and Design Award 2019. Creator of Biodomek System - natural modules for portable dwelling.

Jan Dowgiałło

OSBN, Mech.Build, Poland

Architect, urbanist and designer from Warsaw, co-founder of mech.build, member of the Polish Natural Building Association (OSBN) and the Sustainable Development Team of the Polish Architects Association. As a lecturer of Social Arts at the University of Warsaw, he focuses on designing and building temporary objects and ephemeral greenery.

Anna Zawadzka

Mech.Build, OSBN, Poland

Architect, sociologist, co-founder of Mech.Build, member of the Polish Natural Building Association (OSBN) and the Sustainable Development Team of the Polish Architects Association.

Member of the Management Board of The Warsaw Branch of the Association of Polish Architects acting in the field of climate crisis architecture and natural architecture and the Member of Polish Chamber of Architects in Masovian District. As lecturer of Social Arts at the University of Warsaw, she puts emphasis on designing and building temporary objects and ephemeral greenery.

Katarina Kierulf

Organica, Slovakia

Katarina is predominantly a craftsman that studies architecture. Whilst growing up in Slovakia at her mom's eco-center (o.z.ArTUR) she attended plentiful of clay and straw-building courses at an early age. Later, she moved to Norway to study and work as a carpenter with traditional wooden boatbuilding. Now, she studies architecture & specializes in different building techniques with clay and fibers. Together with Emma Buchanan she started an art-architecture group called Street Earth CPH, that experiments, and builds sculptures out of natural and local materials in an urban setting.

Jorida Muço

Durrës Municipality. Albania

Jorida Muço is an architect at Urban Planning Directorate at Durrës Municipality, whose main mission is designing architecture projects, in public buildings and urban rehabilitation projects in public spaces. She designs new and reconstruction projects on different scales. She has worked in the past seven years in public sector, at central government institutions and at local government. She has also worked in private sector as senior architect of an architecture office. She is now working on reconstruction of damaged buildings, from the 6.4 magnitude earthquake, which hit Albania, in November 2019.

Viola Cikalleshi

Emergency Center of Durrës, Albania

Viola Cikalleshi is the Director of the Emergency Center of Durrës. The center provides social support and services to emergency cases of women and children. With a long experience in working with the communities of Ex-Swamp Area, her expertise in the project was focused on the social perspective of the intervention: Working with the communities for embracing and preservation of natural building and implementing its techniques in harmony with the nature, environment and quality of wellbeing.

2021

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