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Earth buildings – reintroducing an old technique for green cities

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Earth buildings – reintroducing an old technique for green cities

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Abstract. It is widely believed that historic urban fabrics make an important contribution to foster identity and a sense of belonging for local people. To restore historic buildings, particular vernacular structures, is therefore an important contribution to achieve urban structures that deal with and respect local people with their particular way of living. One such historic element is earth construction, and in this case earth constructions of the central and eastern Europe region. Earth constructions turned out to be beneficiary for the micro climate, because of the material's ability to balance between day and night temperatures. Earth constructions are also environmental friendly because the material is at the building site and it can be maintained easily. Besides, earth buildings and villages have a distinct character, which were developed over centuries. Finally, earth constructions could play an essential role in the process of making cities green, and therefore some techniques have to be developed to bring earth constructions to big cities and make them green and environmental friendly
Unfortunately, earth constructions are declining and are used only in outlying regions. To understand this old technique, and to bring back the knowledge to local people as well as sensitize governments and stakeholders is essential to help fostering earth buildings,. This is the focus of the contribution, where earth constructions in Central and East Europe are focused on and first results will be presented.

Keywords: Earth, environmental architecture, vernacular architecture

1. Introduction

Earthen architecture[1] is an essential part of the architectural culture in many regions of the world. However, in Europe during the 20th century most earthen structures have been replaced by modern materials and due to technological, economic, and social changes, traditional knowledge related to earth construction has largely been forgotten. Architectural witnesses of this versatile building material are continuously and rapidly disappearing. Thus, expert knowledge on clay as a building material has become rare. This complicates the conservation of earthen buildings and threatens the continued existence of a centuries-old European architecture. The stock of earthen architecture, which is certainly a valuable part of the architectural heritage, seems to be unstoppably decimated by demolition, in many cases out of ignorance. Negligence and no or inappropriately conducted maintenance precede this irreversible loss. Therefore a detailed recording of the existing earthen architecture and the development of new approaches towards its renovation is important to provide a sound basis for a better handling of this heritage in the future.

[1]Earthen architecture is made out of earth and additives such as sand, gravel, organic fiber (straw, sawdust, bushes etc.), dung, oil etc. Major earth building technologies used in Europe are mud brick (adobe), rammed earth, cob and different filling techniques. Earthen constructions were and still are in use all over Europe, depending on the availability of suitable soil.

Fig. 1. An old earthen building in the White Carpathians, Slovakia. Without maintenance the buildings rapidly decay. (Photo: U. Herbig)

2. The advantage of preserving earthen architecture

The **ecological advantages** of earthen architecture are manifold: Earth constructions consume very little energy, they do not have to be transported over long distances, they are completely recyclable, and they have good humidity-balancing properties, compensate temperature fluctuations, and create a healthy micro climate. In addition, preserving existing earthen structures helps to embark the consumption of further building material and stops the exploitation of ever new land resources [1], [2], [3].

On an **economic level**, the up-keeping of earthen structures helps to stimulate regional economies, from the local construction industry to eco-tourism. The use of materials from the region supports local construction businesses and local craftsmanship can be advanced and developed further. Another important fact is the empowerment of the people to get further involved into self-building processes, and also the up-keeping and small restoration work can be done by the people themselves [4].

Fig. 2: Brantelhof, Burgenland, Austria. The well maintained earthen building is a landmark in the area. (photo: U. Herbig)

From a **cultural perspective** it is very important to conserve traditional building techniques and the knowledge about them. The preservation of historic villages and town ensembles plays a significant role regarding the formation of a collective identity. The preservation of earthen architecture, as an important part of the cultural built landscape, is essential to keep up civic pride and a sense of belonging. The interest on such unique forms of architecture from outside, e.g. via tourism, further strengthens local identities and community efforts.

3. How to raise awareness regarding earthen heritage

In Western European countries such as Spain, France, Switzerland, Germany, Great Britain and Italy quite intensive research on earthen heritage has been going on during the last decade, especially with the project `Terra Incognita - Earthen architecture in Europe´[2] [5]. In Eastern European countries many national activities have been going on promoting the preservation of knowledge about the earthen heritage e.g. by experimental research within open air museums or other cultural institutions. However, there only very few existing trans-national networks to combine knowledge generation from such research activities and to give a comprehensive picture of the state of earthen architecture within the Eastern parts of Europe.
Therefore the implementation of trans-national measures to protect the earthen heritage should be on top of the agenda. Main objectives are the
- making of an inventory of existing earthen structures
- implementation of advanced preservation measurements
- exchange of specific knowledge amongst specialists, craftsmen, users and scholars and the establishment of a (Eastern) European network

[2] `Terra Incognita´ is a European project which aims to create an inventory on the European earthen architecture. It was implemented within the frame of the European Union pro gramme Culture 2007-2013. So far the main focus is on earthen architecture in the Western parts of Europe.

Through the making of an inventory collected information can be merged. The research and documentation should include single objects as well as ensembles and should focus on the following aspects: Building typologies, building history, building technologies, the state of preservation, the use of the buildings or the research on building and raw material. The active involvement of the local population by using participatory measures, supported by PPGIS (public participation GIS) and the Internet should be promoted. In addition to documentation activities, personal inspection and aerial reconnaissance on the site and the direct contact to the objects and their users as well as the integration of existing projects will be essential.

Fig. 3: Examining historic earth building techniques at a student workshop in Sopron, Hungary (photo: A. Rieger-Jandl)

The implementation of new preservation strategies can only be tested with the help of pilot projects. Addressing professionals and users, practical knowledge has to find its way to the builder and contribute to the conservation of existing earthen heritage and the use of traditionally grown knowledge. Raising awareness regarding the preservation of architectural heritage, its conversion and re-use versus its destruction has to be a key aim. Installing a cadaster of protected areas and a catalog containing recordings for conversion and re-use will be of major importance and thus the topic has also be installed on a governmental level, locally as well as regionally.
The exchange of knowledge will be of utmost importance to raise awareness for the value of earthen architecture. The neglect of the earthen heritage over the last decades creates a need for its promotion on a scientific *and* practical level. Conferences, workshops, public presentations and the integration of the research in education programs at universities/polytechnic institutions and schools as well as the establishment of advisory and information centers or initiating practical training programs to approach the public and local users will be an important foundation. Publication tools, such as the internet, applications for smart phones, articles in (local) newspapers and documentary films will transport the knowledge. An important goal in this phase is to raise the awareness for the local clay building history through the possibility of public participation. In that way local architectural traditions which are essential for the identity of particular regions can be brought back to attention.

Conclusions

According to the arguments given above, this paper is a plea for the promotion and preservation of earthen structures in the Eastern parts of Europe. Before starting this process it will be necessary to raise awareness for the problems addressed, which can only be solved on a trans-national level through a European-wide cooperation. In summing up the facts, the following targets and activities can be identified:

- Strengthening the exchange of expertise between institutions in Eastern Europe already having extensive knowledge in the field of earthen constructions.
- Creating a powerful international and interdisciplinary oriented research team including young researchers and female scientists.

- Offering new opportunities in dealing with the building material clay, in preserving clay building traditions before their demise and supporting the use of this sustainable and ecologically valuable building material.
- Strengthening awareness for clay as building material by supporting hands-on participatory action in the course of exemplary conservation and restoration projects as well as by re-opening historic clay pits in order to support the use of natural clay resources.
- Encouraging the local population to share their knowledge on earthen constructions via an online-platform. Their contributions will be included in an inventory of local earthen building cultures.
- Extending scientific knowledge and facilitating its exchange in areas with similar historical building techniques in earth architecture.
- Collecting data on buildings, clay pits and forgotten earth building techniques on the basis of a special adapted GIS (Geographic Information System).
- To analyze the properties of clay minerals as well as to test composite clay materials mixed with straw and other aggregates.
- To support specific pilot projects, which are tailored to particular places and situations due to architectonic measures.
- By integrating the research results in education programs at universities, polytechnic institutions and schools, building with traditional materials will move back into the focus of designing.
- Perfection and optimization of tools and methods used when analysing and evaluating historical earth buildings in the participating countries.
- Perspective of collective/shared dissemination and publication of research outcomes in national and international media (scientific magazines, international conferences).

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