04. Materials

Harvesting building materials locally

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Producing materials locally

Before the industrial revolution and the introduction of patented building products and systems, constructing homes was mainly a local affair everywhere around the world, with artisans from the region working together within an open network of knowledge and skills. *Knowledge* about the qualitative application of locally available natural materials, such as earth, wood and fibres like reed, for example, *was passed on from generation to generation*, and *building skills were* often *acquired in practice*. Much of this regional expertise has been lost over time due to the introduction of mass-produced materials such as concrete, mineral wool and steel, and the globalization of the construction industry. However, transitioning to a circular built environment forces us to reconsider the negative impact modern materials have on the environment -mainly in terms of raw material use and energy consumption during production. In this light, re-introducing localized building practices based on regenerative materials from the region is worth exploring. So, here are some basic notions related to local building practices.

What is a regional cultural landscape?

Since the invention of agriculture, 12.000 to 5.000 years ago, people have strongly influenced the natural landscape by developing ways to cultivate crops for food, clothing and other products, leading to the emergence of the cultural landscape phenomenon. Also harvesting trees for the construction of homes is part of human culture since prehistoric times. The regional cultural landscape can thus be seen as the cradle for the local supply of natural building materials. *On each type of soil different types of trees and plants thrive and grow; these are regenerative resources which form the basis of renewable building materials.*

What do we need to know about the natural resources?

The raw resources for the production of construction materials can be classified in three main categories: *earth, wood and fibres*. This classification can be used for most landscape types. *In order to achieve a balanced regional value chain of local construction materials, it's important to understand to what extent resources can be harvested without overexploiting the eco-system.* In this respect much can be learned from indigenous communities, such as the Baduy tribe in West Java in Indonesia, in which humans see themselves and their cultural habits, such as constructing their homes and settlements, as part of the natural environment. There is a deep understanding of the capacity of the landscape, its soil, species, plants and trees, which enables the Baduy to steward their resources responsibly and

live in ecosystemic harmony.

What is the impact of using locally harvested materials on crafts & technology?

Nowadays, we are getting increasingly more accustomed to using robots to construct our homes; one could almost forget that housing construction is also a cultural act, traditionally providing many people with a meaningful job connected to their region. Considering their performance in terms of circularity, robots can shorten construction time and reduce waste; a low-tech construction approach, however, in which raw materials are assembled in their purest possible form can also significantly reduce energy and material consumption. Plus, it contributes to establishing a local building culture that is based on the different material combinations that are available to each region. Furthermore, low-tech building methods make custom-made applications of regional natural materials affordable.

The Bouwtuin Experience

With my group, Bouwtuin, in 2021, we undertook an *action research in the Gooi & Vechtstreek, a subregion of the Metropolitan Region of Amsterdam.* This small region can be described best as a mosaic of exemplary Dutch landscapes and soil types. Including forest and heathland on sand, peat-meadow & wetland areas on peat, and arable land on clay. This variety made it an ideal environment to research and redevelop biological materials and craft a circular strategy for scaling up the production of these materials within the limits of the region's natural capacity. Furthermore, as part of the action research in the Gooi & Vechtstreek three sample homes have been designed by Bouwtuin as part of a specific residential landscape typology per soil type, using the available natural materials at hand.

The homes consist of prefabricated timber frame elements. Biobased materials in combination with earth are used as infill. Following John Habraken's Open Building principles, facade, floor and roof elements are detachable and offer room for different variations of the material for the construction, insulation and finishing layer, thereby contributing to a recognizable and valuable regional architecture per landscape type. Another action was to identify the resources of the *regional cultural landscape*: thus, the natural residual flows from the region that can be used for making building products, either released during agricultural activities or nature management, but also cultivated construction material crops, including hemp, flax and cattail. Then, we *calculated the pressure on the landscape* to grow the materials needed per home. For the timber frame of all homes for example we used Douglas Fir, which is the largest residual wood flow resulting from the nature conservation activities of het Goois Natuurreservaat. We calculated that only 5 Douglas Firs are needed to construct the timber frames for one home. And estimated that there is sufficient regionally harvested Douglas Fir to make 35 basic homes on a yearly basis.

The Bouwtuin project demonstrated that homes can once again become a natural part of the regional cultural landscape connecting their inhabitants to the local eco-system, while also enhancing its quality.