

Material Regionalism: Vorarlberg's Sustainable Timber Construction Tradition

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Located on the northwestern slopes of the Austrian Alps and bordering the countries of Germany, Switzerland, and Liechtenstein, Vorarlberg is the second smallest Austrian province, but also the second most densely populated after Vienna. Its population of 367,000¹ is hardly even that of a medium-sized European city, and inhabits an area of roughly 2,600 square kilometers (1,000 square miles)². Vorarlberg is geographically closed off from the rest of Austria, and the only connections to the neighboring province of Tyrol are provided by three surface roads, as well as the railroad and street tunnel through the Arlberg mountain. Due to its isolated location, most of the province's population speaks a distinctive German dialect which many of the country's other inhabitants find hard to understand. It is similar to the Alemannic dialects spoken in Switzerland, Liechtenstein, the Alsace region in France, and parts of southwestern Germany, whereas the dialects spoken in the rest of Austria form part of the Bavarian-Austrian language group. Many towns and villages even have their own distinct sub-dialects.

Vorarlberg is an alpine region and extremely mountainous, and therefore offers unfavorable conditions for intensive farming. It also does not possess any significant valuable natural resources. For centuries, the land could not feed the population, and the younger generations were sent abroad as seasonal workers to the more prosperous neighboring countries. The province had a strong rural agricultural tradition, but it experienced an early industrialization at the beginning of the 19th century, particularly in the area of textile manufacturing. The rise of the textile industry had its origins in the traditional production of linen, and benefited greatly from the craftsmanship and skill set of the

farming population, which in return became heavily involved in the home-based manufacturing of industrial textiles and other goods. Up to the 19th century, Vorarlberg was sparsely inhabited, and its population was mostly homogeneous. The regulation of the Rhine River, the construction of the railroad, and the use of waterpower gave the province a basis for its own economic growth, and also led to an influx of foreign labor, particularly from Italy and Turkey.³ Today, Vorarlberg is the most heavily industrialized region of Austria, but it produces with the lowest energy consumption. 97% of the province's electricity is generated through hydroelectric power, with the Ill valley being the center of power production.⁴ Of 169,000 people employed, only 3,000 still work in farming and forestry, but 67,000 work in textile, electrical, and machine manufacturing and construction.⁵ The per capita production of export goods is four times higher than the United States or Japan, and is only surpassed by Switzerland.

Due to Vorarlberg's size, it might come as a surprise that the emergence of its contemporary and innovative timber architecture over the last three decades is unparalleled in Europe. Deeply rooted in the region's longstanding tradition of building craft, a number of pioneering architects have established a strong technical, cost-efficient, and functional vocabulary that has evolved into a unique architectural culture. Today, this exclusive setting serves as a laboratory in which architects and craftsmen search for a symbiotic connection between a specifically regional architecture on the one hand, and a progressive architectural formal language on the other. In addition, they explore the relationship between technology and ecology, as well as between housing needs and the requirements of the industry.

THE CARPENTRY TRADE

Carpentry is one of the oldest and most important building trades and forms the foundation of Vorarlberg's architectural culture. Individual master craftsmen could reach the highest social status as citizens of cities and rural communities. The trade was organized in so-called guilds which regulated the profession and determined how master craftsmen, journeymen, and apprentices lived together. The guilds controlled pricing and the quality of completed work, and prevented fraudulent activities, as well as excessive competition. Besides determining the rules of conduct, they were also religious associations in the honor of God. Precise regulations established the apprentices' education during their three-year training period and dictated god-fearing and honorable lifestyles. A final practical exam concluded the apprenticeship and consisted of either a building or a model, the so-called journeyman's piece.

This was followed by a three-year journey which the apprentice would use to get familiar with other parts of the world and new working methods. The rules were very strict. The journeymen were not allowed to come home during that time, nor could they work on the same building site for more than six months. Guild houses were located all across Europe, and even today journeyman carpenters can be seen traveling in their guild attire, wearing a black corduroy vest and bell-bottomed pants, and a wide-brimmed hat. The collaborative work in the field and the shared life in the guild houses fostered a strong sense of belonging and community, and allowed the carpentry guilds to survive till present day.

Since Vorarlberg was a poor province with few significant commissions, most of the work by Vorarlberg craftsmen was, in fact, performed abroad. The guilds were able to exploit the building boom after the destruction of the Thirty Years' War (1618-1648). Between 1650 and 1800, craftsmen from Vorarlberg constructed several hundred large projects in Southern Germany, Switzerland, Alsace, and Bohemia. As a result, not only Vorarlberg's journeymen were traveling, the entire guild was on the road. Some villages report that during the building season between March and October, nearly 90% of the male population were working away from home. Vorarlberg's Baroque master builders designed

many churches and monasteries, and some of the best examples can be found in Birnau and Weingarten in Germany, as well as Sankt Gallen and Einsiedeln in Switzerland. Famous builders such as Franz Beer and Peter Thumb became very wealthy and settled in larger cities such as Constance.

Up to the 19th century, carpenters were not only craftsmen, but they also fulfilled the role of architect and engineer. Industrialization brought some new tasks, such as the design and construction of concrete formwork, but generally, the carpenter's responsibilities diminished significantly. The tools of the trade remained virtually unchanged between the Middle Ages and the 20th century, when manual labor was increasingly replaced by power tools and the use of machinery.⁶

TIMBER

One third of Vorarlberg is still covered with forest.⁷ As early as the Middle Ages, forests in mountainous areas were identified to fulfill important protective functions. Located at high altitudes above settlements, they serve as effective measures against avalanches and landslides. Today's effects of pollution and the resulting forest dieback are a global problem, but are proving to be particularly disastrous for alpine regions.

In the past, logging the timber was also part of the craftsmen's responsibility. A large structure like a church or monastery could consume entire forests, and the carpenters themselves would go and select healthy and straight trees for construction. The carpenters would then mill the logs and turn them into lumber for construction. Flourishing sawmills put an end to the close relationship the carpenters had established with the material as a result of manual processing. Timber for construction was now cut cost-effectively by the mills and readily available for purchase. However, in some remote valleys and settlements, carpenters and farmers retained the old manual timber processing techniques all the way into the 1950s.

Vorarlberg is not only densely wooded, but it also possesses numerous creeks and rivers which facilitated the installation of water-powered saw mills. Up to the 19th century, almost every village owned at least one saw mill, and many farmers shared communal facilities close to the forests they owned.

Improvements to the infrastructure and increased motorization in the 20th century signaled the end for smaller mills, and only the larger and more efficient ones were able to survive. New manufacturing techniques such as the production of glulam beams and concrete formwork opened up new markets and export opportunities for saw mills and carpentry businesses throughout Vorarlberg.⁸

THE TIMBER HOUSE

Its excellent insulating properties make timber the obvious building material of choice in the cold climate of the Alps, and it is much preferred over masonry construction. The abundance of timber allowed a tradition of craft and carpentry to evolve over centuries. The Bregenzerwald region in Vorarlberg boasts one of the best preserved timber construction traditions in Europe. In all parts of the province however, timber construction dominates, and it can be found not only in the mountainous regions, but also at the shores of Lake Constance and the Rhine River valley. If allowed to dry out properly, timber-framed houses are extremely durable and can withstand even the harsh conditions found in the mountains. Careful detailing and assembly techniques can successfully protect untreated wooden building parts such as facades, windows, and doors from rain, wind, and snow. Over time, surfaces facing the sun will be burnt and turn a dark brown color, while the shaded sides of a building will turn a silvery grey as they age. By following rules that were established by craftsmen over centuries and handed down from generation to generation, timber houses can last exceptionally long periods of time. Some of the most successful examples in the Bregenzerwald region date back to the 17th century. External influences, due to Vorarlberg's proximity to other countries and its fragmented and varied landscape, contributed to the evolution of several different vernacular house types.

Timber was plentiful in the beginning of Vorarlberg's colonization, and one of the first settlers' main tasks was the clearing of forests. Before fossil fuels were available, timber was the sole energy source, in addition to serving as the dominant construction material and for the manufacturing of everyday goods. Extensive logging created a shortage, which led to the creation of strict laws and limitations regarding its use.⁹ It is therefore no

surprise that the origins of the word *sustainability* can be found in 18th century European forestry regulations. In his 1713 publication of *Sylvicultura oeconomica*, the first comprehensive treatise on forestry, the German administrator Carl von Carlowitz used the term *nachhaltend* (sustainable) to formulate the concept of sustainability in forestry for the very first time.¹⁰ The idea of *Nachhaltigkeit*, or sustainability, caught on in Europe throughout the 18th century. Vast areas were reforested, measured and divided, soils were evaluated, and plants and animals were classified. The deforestation was reversed. Forestry academies were founded in Germany, France, and England, and the term was eventually translated into other languages, resulting in the 19th century English term *sustained yield forestry*, which would serve as the source for the word *sustainability* in the modern sense. Nevertheless, timber remained the cheapest building material for Vorarlberg farmers all the way into the 19th century. Almost everything in and around the house was made of wood: the furniture, the paneling in the parlor, the roof covering with several layers of shingles, the neatly stacked piles of firewood for the stove, most of the farming tools, and even the everyday footwear.

TRADITIONAL HOUSES

By subdividing and adding to initially primitive one-room buildings, the varying farmhouse types of the different Vorarlberg landscapes were developed. The traditional farmhouse was not the end result of a closed development cycle, but it reacted to constantly changing social and economic conditions. Certain time periods throughout history experienced significant changes and innovations. In the 17th century, the restoration of peace at the end of the Thirty Years' War meant an increase of prosperity and population, which resulted in larger and more magnificent homes. Then, intensive farming practices in the 19th century forced farmers to increase their livestock, which in return required larger stables and more storage space for feed. Outbuildings were enlarged, and existing roof pitches were steepened in order to allow attic spaces to hold more hay.¹¹

TIMBER CONSTRUCTION SYSTEMS

The *Ständerbohlenbau*, a post-and-beam construction method, is the oldest timber construction tech-

nique in Vorarlberg, and only a few examples have survived over time (Figure 1). Derived from a construction practice where vertical posts were simply driven into the ground, later techniques rest the posts on a masonry foundation in order to keep any timber elements away from moisture. Posts and beams make up the structural framework, and horizontal timber planks 8-12cm in width form the walls. These are slotted into vertical grooves which have been cut into the posts.¹² The *Ständer-bohlenbau* uses considerably less wood than the more massive log construction, and was therefore mostly used for outbuildings such as hay barns and stables.¹³



Figure 1. Post-and-beam construction, Sulz



Figure 2. Log construction, Dornbirn

The *Blockbau*, or log construction, is the building technique most commonly used for traditional farmhouses in Vorarlberg (Figure 2). Timber members are stacked horizontally and are linked in the corners using coggled joints. Hardwood pegs were inserted into the logs to interlock the individual courses, creating a structure of great rigidity.¹⁴ With increasing industrialization, the availability of mass-produced inexpensive nails allowed the facades to be clad with a scale-like shingle skin which effectively protected the structural members from rain.

When thinking of traditional European houses, the typical *Fachwerkbau* or timber-frame construction usually comes to mind. This system consists of a structural framework which is filled in with wattles, clay, and chopped straw. Vorarlberg is in fact the only Austrian province that possesses a significant number of these types of buildings, which is due to the fact that it is geographically located at a point where different construction techniques meet, making for an interesting mix of styles. However, timber-framed houses were mostly built in areas rich with deciduous trees, since these predominantly produced short structural members. Construction systems such as post-and-beam construction and log construction were prevalent in Vorarlberg, taking advantage of the abundance of coniferous trees which provided long and straight members.¹⁵

CHANGE IN TRADITION

Vorarlberg's timber construction tradition was put to the test with the rise of the bourgeois class and the establishment of new values in the late 19th century. Suddenly, timber houses conveyed an image of poverty and being old-fashioned, since they were considered a sign of belonging to the working class. In addition, it became popular belief that timber was an ephemeral and perishable building material, even though thousands of historic timber buildings proved otherwise. Masonry homes were the new status symbol of the middle and upper classes and became the prevalent building type. As a result, many timber houses were covered up with stucco after the fact, in order to make them look like their more expensive masonry neighbors.¹⁶

The advantages of timber construction were rediscovered in times of economic hardship. Between World War I and II, the distinguished Austrian architect Clemens Holzmeister published his essay

Der Holzhausbau, or Timber House Construction, which discussed the decline of the timber construction tradition. In his publication, Holzmeister presents numerous encouraging examples of successful old timber buildings, many of them in Vorarlberg, and points the way to a new era of timber construction. Above all, he points out the positive impact of managed forestry and the use of locally available resources on the economy in times of crisis.

In the 1930s, the Austrian federal government launched a building program to battle the housing shortage and rising unemployment. Across the country, the creation of new housing estates at the perimeters of existing settlements was aimed at providing jobs and housing for the unemployed and short-term workers. Eight of these estates were developed in Vorarlberg, and all of the homes were built using the traditional log construction technique with members 12cm thick. The large amount of readily available labor allowed for cost-effective prefabrication. Additionally, the chosen timber system enabled future owners to contribute about 1,500 hours of their own time and labor towards the construction of their home. This set a new precedent. Architects in Vorarlberg would use this combination of professional, industrialized prefabrication with unskilled do-it-yourself labor for the construction of residential projects in the future.¹⁷

NEW TIMBER CONSTRUCTION

Timber construction finally experienced a revival in the 1960s, when a group of young architects started practicing in Vorarlberg. Hans Purin, Rudolf Wäger, Jakob Albrecht, Gunter Wratzfeld, and Leopold Kaufmann designed timber houses, which, through their lack of traditional elements such as roof overhangs in combination with open floor plans, flat roofs, and unusually large windows, received a lot of criticism among the general population. Leopold Kaufmann remarks: "My first projects – in the sixties – had neither the proper roof, nor the proper form, nor the right windows. The result was that my neighbors no longer greeted me after attending Sunday Mass."¹⁸ With their designs, they formulated alternatives to the prevalent local provincialism, which was the result of misguided formal interpretations of the historic building stock.¹⁹ Rudolf Wäger states: "I consciously attempted to build in opposition to traditional tendencies. During my apprenticeship as a carpenter, I realized how

thoughtless the so-called traditional construction had become. These stereotypical houses were not really traditional buildings... I did not want to derive new possibilities and variations in a well-behaved and consistent manner, but needed to oppose this thoughtlessness."²⁰ The architects established a dialogue with the region's rich timber building tradition and used the carpentry trade's craftsmanship skills as a basis for their new timber-frame construction systems. Working with timber also meant that buildings had to be well constructed. How walls and roofs were assembled and put together was essential. Space-making began with designing the structural system, which played an important role as an expressive visual element.



Figure. 3. Hans Purin: Halde housing estate

Vorarlberg's population is known as being thrifty, and its motto "Schaffa, schaffa, Hüsle baa." translates to "Work, work, and build a little house." While the single-family home continued to be the prevalent housing type, the strong desire of home ownership contributed to urban sprawl and put home owners under enormous financial pressure. An important question arose among architects: Who are we building for if most people cannot afford their own house? Hans Purin, one of the pioneers of the new movement, offered a solution to the problem with the design of the housing estate Halde in Bludenz in 1964 (Figure 3). A framework of massive masonry walls was provided, which could then be filled in by the future residents using a system of light-weight timber-framed floors and walls. The owners completed approximately 20% of the construction themselves; and through this, the project served as

an excellent example for simple, cost-efficient, and collaborative building. According to Austria's most well-known architectural critic Friedrich Achleitner, the Halde housing estate "still belongs to the most respectable achievements in Austrian residential construction."²¹ The newly formed *Cooperative*, a group of young architects consisting of Dietmar Eberle, Wolfgang Juen, Markus Koch, and Norbert Mittersteiner, used a similar approach in 1979 when designing the Im Fang housing estate (Figure 4). In cooperation with their clients, they were looking to develop alternative ways of living and building together. Timber was the building material of choice, since it was easy to process without the need for heavy machinery or highly skilled workers, and also allowed for simple structural systems and a large amount of flexibility.²² While professional carpenters erected the primary timber-framed structure, the floors, walls, glazing, winter gardens, and cladding were completed by the young architects and future residents. This made the project financially viable for everyone involved and allowed for individual variations and the creation of communal living spaces that were unprecedented on the housing market at that time.²³



Figure 4. Cooperative: Im Fang housing estate

At times, the simplest, most efficient way to produce a particular building element influenced design decisions more than purely formal aspects, which resulted in a new aesthetic that was initially rejected by the general population and the building authorities. The new timber houses were disparagingly called chicken coops or barns, since their appearance contradicted with the popular expectations of a privately owned home. The experience gained in working on these low-cost projects al-

lowed the architects in Vorarlberg to develop professional and logistic skills that addressed all aspects of the building process. The quality of the built environment reached a new level, which impressed and increasingly convinced the large building cooperatives, construction companies, and local authorities. The resulting simplicity, rationality, and minimal aesthetic were not the product of theoretically applied ideas, but the outcome of a profession aspiring to make a step-by-step transition from traditional craftsmanship to customized industrial fabrication. Straight-forward modern construction methods were employed, with the goal of minimizing the use of material while generating a maximum amount of enclosed space. Once understood, this approach suited the native population's thriftiness and their highly developed sense of value for money.²⁴

TIMBER ARCHITECTURE TODAY

Vorarlberg's contemporary architecture is a result of a regional development that is unprecedented. As a continuation of what started in the 1960s, the local architects have worked systematically over the last three decades to establish expertise in technology, cost efficiency, and functionality. Their work is not based on formal aspects, but primarily focuses on influences from today's construction industry and manufacturing technology. Spaces are conceived through an exploration and integration of structure, assembly, and function, and not through short-lived superficial formalisms. Concepts are grounded on structural efficiency, maximum use of minimal resources, usability, and the client's needs which results in simple, yet very functional spaces. This sophisticated simplicity should not be misconstrued as being plain or basic, and is best described using German architect Heinrich Tessenow's words: "Das Einfache ist nicht immer das Beste, aber das Beste ist immer einfach." meaning "The simplest form is not always the best, but the best is always simple." Through predominantly building with timber, the architects developed a rigor and expertise as part of their design process which has also proven useful when employing other building materials and construction techniques.

The initial members of the movement were fundamentally opposed to a formal regionalism that was based on misunderstood tradition. Their intention was not to replicate traditional forms, but to trans-

late and update traditional processes and principles. As a result, architects and craftsmen together have been successful in finding a contemporary answer to the continuation of the local timber building tradition. Vorarlberg's architecture is unique in the fact that it takes up extremely modern tendencies such as the promotion of modular living accommodations or the use of the latest industrial building components, without ignoring and abandoning the traditional construction skills and housing typologies of the region (Fig. 5). The harmonious juxtaposition of old building stock with contemporary interpretations proves that it is possible to continue tradition, while at the same time not rejecting contemporary life.

Initially, this critical discourse involved small-scale private projects which allowed the architects to easily test ideas and concepts. The invaluable knowledge gained through this experience enabled them to successfully transition to working with investors and public authorities on more complex and larger public commissions.²⁵ This unique development was not the product of the architects alone. Enlightened clients, a climate for open discussion, the cooperation of the authorities, and a broad consensus on aesthetic qualities and energy consumption have contributed to the appreciation and promotion of contemporary and sustainable architectural principles at all levels of society. The traditional carpentry trade has successfully made the transition to modern fabrication techniques, and plays an active and important role in the planning and design process by setting extremely high craftsmanship standards. Today, there are many open-minded timber manufacturers which have a vested interest in cooperating with architects in order to improve and promote their building products. Prefabrication plays a very important role, but is rooted in the carefully crafted customization of the carpentry trade, rather than inexpensive industrialized mass production.²⁶ Many manufacturers offer entire prefabricated kit houses, which have been developed in collaboration with architects.

The increasing industrialization of the construction process and the use of prefabrication techniques minimize waste and help to optimize the use of energy and resources. Added value is retained in the region by employing local businesses and using locally sourced building materials. In association with energy providers, the regional government found-



Figure 5. Fink Thurnher: Daycare Center, Langenegg; Oskar Leo Kaufmann and Albert Rűf: House Rűscher, Schnepfau; Johannes Kaufmann: Community Center, Raggal

ed the *Energieinstitut Vorarlberg* in 1985, which actively promotes reduced energy consumption, the use of renewable energy sources, and environmentally friendly building products. It also provides incentives and funding for private home builders and public investors based on a set of ecological guidelines, and through this, Vorarlberg possesses the highest number of low-energy and passive energy houses in Austria today. The province has been able to develop sustainable construction practices while still retaining its unique regional style, and continues to serve as a role model for not only Austria but all of Europe. Many of Vorarlberg's architects now teach at universities and build in Germany, Switzerland, Liechtenstein, China, and other countries. The region's unique and sensitive approach to building provides convincing evidence of the architects' involvement in the problems and needs of the society in which they live.

ENDNOTES

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