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Environmental reply to vernacular habitat conformation from a vast areas of Scandinavia

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ABSTRACT

There are many original ideas and useful system inputs embedded in the building of human settlements in Scandinavian regions, where the landscape and habitat are strongly interconnected. A cold climate and strong winds are the most prominent risks that affect habitats. The Longhouse is the foremost traditional habitat in the Scandinavian region, dating back to the Iron Age, 2000 BC. This study examines the influence of climate on the conformation of habitats. Climate had a solid impact on the conceptions of habitat form and internal space. Wind and extreme temperatures had firming consequences on the housing arrangements, layouts, orientations, and building materials used in the construction process. Habitats from this region were located in an optimal arrangement, and the south orientation was used effectively. This investigation will provide an evaluative interpretation and analysis of the real facts of vernacular habitats in the context of energy efficiency and ecological concepts, considering human settlement patterns, architectural creation and building material uses.

Contents

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1. Introduction

Vernacular architecture was highly responsive to its immediate environment because the owners and buildings understood their situation better than we understand ours today, which is the result of several differences in lifestyle [1]. The relation between space and volume and detailed outlooks deriving from adaptation to environmental conditions result in a type of architecture with strong specific features. In Scandinavia's climate, the insulating quality of materials is exploited, and solar heating is encouraged [2]. The aggressive consequences of dominant winds oblige builders to find a solution to combatting their negative effects. Windbreaks around houses are a widespread tradition for creating better comfort around the house and conserving energy [3]. The thermal impacts on built systems and building orientation have a primary influence on building techniques. Energy efficiency is not an inert assembly of materials and components; it has to have, or at least has to mimic, the attributes of an organism [4]. It must be capable of constant adjustment. The building process managed to isolate the building from unfavourable climatic conditions, creating an internal micro-climate able to provide for physical comfort. Building materials are used to minimise heat loss. The architectural elements are valuable when, with their help, the building succeeds in integrating the outside–inside relation, creating spaces in degradation, corresponding to the traditional in form and function, and creating optimal forms and volumes.

2. Proposal in research theme

Builders from vast regions of Scandinavia have found ways to enhance and manipulate thermal comfort, arranging shelters against aggressive climatic factors that offer protection against wind, cold and snow. Human settlements from this region were founded to create an optimistic particular life, and the habitat unit was not just a place for sleeping, devoid of conceptual model, but rather a place for sustained life, with realistic objectives. Life in cold regional climates in general and in the Scandinavian Region in particular led to the creation of a unique social-cultural life. A constructive reading of the existing environment, climate and the requirements for a comfortable habitat allowed builders to create adaptable and intelligent houses. The most essential question in this study is how can old builders create an adaptive habitat suitable for the local climate and environment in an optimal form.

3. Investigation method

Classification and operative analysis are the main instrumental procedures used to determine the critical thinking model, which puts expectations into requests to detect whether a given right is factual or untrue. The analytical study of our subject starts from the replication of human settlements to the negative act of climate, to analytically interpret building materials used during the building process. The explanation of qualitative code is essential to enquiry and employs many disciplines in the vein of ecological and energy efficiency and sciences that create in-depth understandings of human comfort.

4. Energy validation of regional climate acts

The Scandinavian region consists of Denmark, Sweden, Norwegian and a group of islands at the entrance to the Baltic (Fig. 1).

A series of low-pressure systems moving northeastwards formed over newly found lands form the basis of the characteristic changeable weather. With low-pressure systems, fronts cross the country, often with heavy rain and high winds behind them. The western part of Scandinavia is windier than the rest of the region. A number of severe gales can affect Scandinavia, especially in the winter time [5]. Viewed over a longer period, the climate in South Scandinavia has never been constant. Cold periods have replaced warm periods, and great variations in climate are indicated by glacial and interglacial periods.

Fig. 2 shows the average daily outdoor air temperatures, the difference between the outdoor temperature during the day and the minimum temperature at night, and the amount of energy relating to a horizontal surface in a day. Over the progression of a year, the day length, the angle of the daylight incidence and the intensity of solar radiation change. In the summer, high radiation yields are to be expected, particularly on the east and west sides of buildings. In the winter, solar radiation on the south side is desirable because it reduces the heating energy demand [6](Fig. 3).

In the summer, the level of radiation energy on horizontal surfaces and east and west facades of building reach their highest values, with a certain amount of direct solar radiation also occurring on north facades [7]. In the winter, the only useable solar gains occur primarily on south facades. Winter days are shorter than summer days and provide less illumination, creating the need for more artificial light [8]. The Gulf Stream in the North Sea provides cool summers, with a mean temperature of approximately 16 °C, and not particularly cold winters, with a mean temperature of approximately 0.5 °C. There is a good deal of wind, which is the strongest in the winter and weaker in the summer [9]. The winds from the west are cool in the summertime because of the temperature of the North Sea, as part of the Gulf Stream. In South Scandinavia, winds from the east can be particularly active. Fig. 4 shows longhouse energy radiation in different seasons.

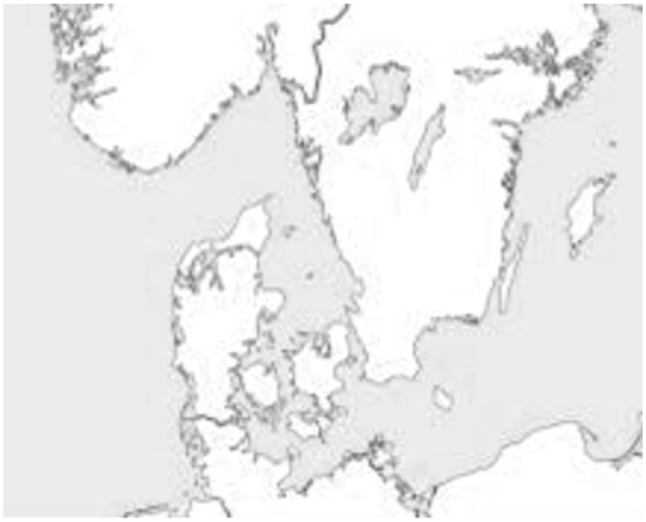

Fig. 1. South Scandinavian Area.