ENVIRONMENTAL CHALLENGES IN THE PROCESS
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# SOLAR CONSTRUCTIONS VERSUS LANDSCAPE BIODIVERSITY

## Introduction

Solar construction is a practical way to design and build homes and other farm objects to live and work in both comfortably and economically, using techniques which reduce energy requirement for heating buildings, domestic water heating, lighting and operating appliances [Schwolsky and Williams, 1982, p. 266].

A variety of approaches enables builders to plan for different levels of energy efficiency in their buildings, and to apply a technique that is suitable for their own environment, climates, market and styles. Solar construction requires changes in a builder's approach to siting. Along with site there are concerns for access, views, drainage and compatibility to the landscape. Builders should consider slope and orientation, wind direction and velocities, vegetation, and the possibility of making use of solar radiation. Careful placement of all the constructions on their sites results also in reduced energy consumption and increased comfort.

Farming is an economic activity involving the processing of natural foodstuffs and other products necessary for the requirements of our fast-growing human population. A failure to take the fragility of the environment into consideration in farming activities and methods can result in the deterioration of the physical, chemical and biological properties of the resources. One should deplore pollution of water and its excessive use, degradation of soil, pollution of air, reduced biodiversity, the homogenization of landscapes and the countryside [Ledwoń, 1998, p. 160].

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Agriculture, in the past, played a vital role in the conservation of species-rich environments and habitats. Nowadays, certain types of farming do maintain this diversity. Intensive farming, on the other hand, has simplified ecosystems to such a degree that is now possible to describe the land it uses as a vast biological desert. Many habitats have been destroyed by the modernisation of farming techniques.

Due to extreme energy consumption in agriculture and the use of heavy machinery, application of solar energy systems could eliminate or at least reduce great deal of the problems mentioned above [Ledwoń, 1999, p. 78].

## Basic principles of solar construction design

**Climate and topography of a site.** A building's ability to provide shelter and comfort economically depends on how it is placed on the site and on the climate at the site. Adapting the design of the building to take advantage of these factors is a fundamental principle of solar construction. Climate varies from one region of the country to another and from one site to another within the same region. The combined influence of different climatic factors greatly affects the ability of a building to shelter its inhabitants. Builders are familiar with using maximum/minimum temperatures and degree-day figures to design a mechanical heating (and eventually cooling) system. However, the design and construction of energy conserving housing must consider other climatic elements as well (Fig. 1).

Topography of a site includes the slope, the shape and the orientation of the land. The steepness of a site influences accessibility, equipment operation, soil stability, waste disposal, footing and foundation plans,

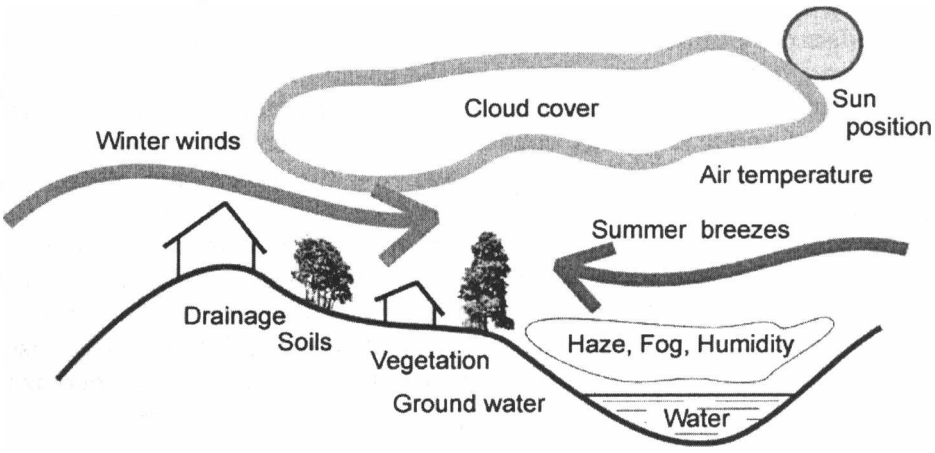


**Fig. 1.** Typical climatic elements at a building site

and cost related to all phases of construction. The topography can create colder or warmer building sites. Wind speed at the top of a slope may be 20% greater than the wind speed on a flat site, given the same conditions. Another „cold site" forms at the foot of long open slopes and in hollows. Colder air collects in lower areas as morning ground fog. From the energy standpoint, the best location for any building placed on a sloping site is at the upper or middle portions, rather than at the crest or at the bottom. Mid-slope areas are generally protected from extreme winds and are not subject to cold air pools, unless a local topographic feature causes a damming effect. Another important aspect of a site slope is its orientation with respect to the sun.

The positioning of a building on its site must also be sensitive to aesthetics (Fig. 2). The most important aesthetics consideration for siting include noise, privacy, and access to views. Besides its usefulness as shade

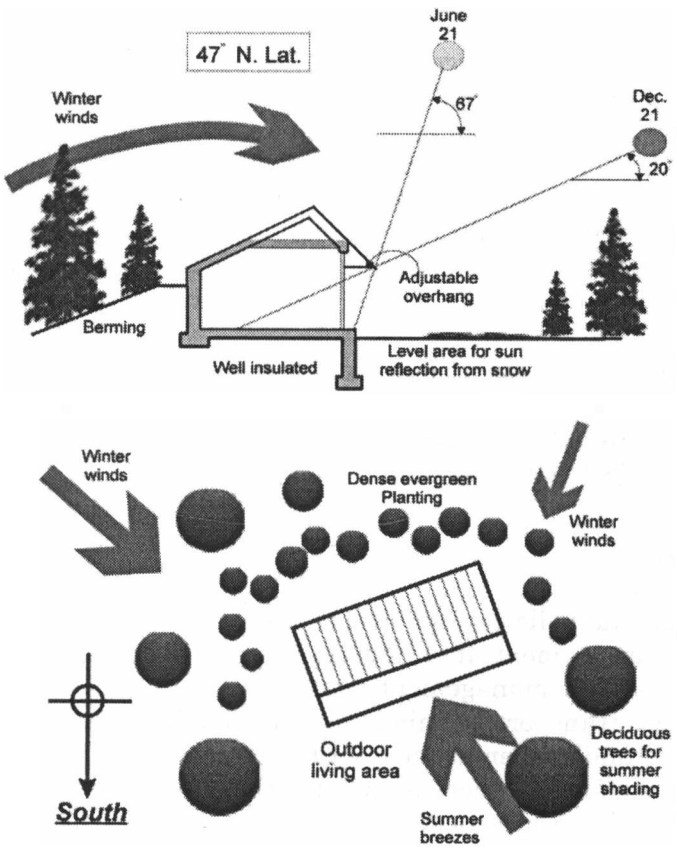


Fig. 2. The placement of the building on its site

and wind control, vegetation can also serve as a buffer against noise from roads, neighbors, or industrial processes. Landscape planning also can provide for privacy. Both of these features will add value to the property by increasing the comfort of its inhabitants and are not in conflict with environmental biodiversity [Schwolsky, Williams, 1982, p. 266].

**Vegetation.** All microclimatic conditions are influenced by plant cover. Plants increase surface for radiation and transpiration, shade the ground, and slow air movement, resulting in a cooler, more humid and stable microclimate. Belts of shrubs or trees can be used effectively as windbreaks reducing velocities by more than 50 percent. Grass or wet ground trends to stabilize temperature extremes and soil structure at a site (fig. 3). Moisture increases the conductivity of the soil, which increases the amount of heat it will absorb, thus reducing daytime temperatures. Grass cover and ground moisture also help to cool the site through evaporation.

Certain species help to produce an environment favourable for the growth of cultivated plants. Organic residue is transformed by worms, bacteria and fungi into humus, which is an essential element of fertile soil.

The establishment of plants as ecological corridors are favourable for biodiversity which should be adopted at the most appropriate level [Ledwoń, 1998, p. 160]. In a general way, flora (and fauna) are natural heritage with scientific, cultural, ethical and intrinsic value, and it behoves us to safeguard this, and hand it on to future generations. Thus, ecological corridors sometimes cross borders and need international co-operation.

Farmers themselves can embark on many types of action to help biodiversity. They are closely acquainted with the land which they manage, and they can apply simple solutions on day-to-day basis, with the help of naturalists if necessary.

## Conclusions

An environmental policy, on its own, is not enough to achieve the aims of sustainable development. It is important to incorporate the principles of ecological resource management into every area of sectoral policy, such as industry, transport, farming, housing and domestic architecture. Action has to be undertaken at the outset and not merely attempt to rectify the adverse effects of these areas of activity. The integration of an environmental policy concerned with national activities has to become a reality and simple measures at farm level are also crucial for biodiversity conservation. All the different socio-economic sectors concerned

must work together and citizens must be kept properly informed. Regional and local levels are particularly relevant for defining and implementing policies adapted to the specific ecological and socio-economic features of each agro-ecological area or region.

## Literature

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