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LANDSCAPE BIODIVERSITY IN CONSTRUCTING SOLAR SYSTEMS

The establishment of plants as ecological structures is favourable for their biodiversity which should be adopted on the most appropriate level. In a general way, flora (and fauna) is our natural heritage with scientific, cultural, ethical and intrinsic value, and behoves us to safeguard this, and hand it on to future generations. The combined influence of different climatic factors greatly affects the ability of a building to shelter its inhabitants. 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.

In the paper, solar constructions as a practical way to design and build houses and other farm objects to live in and work both comfortably and economically, using techniques which reduce energy requirement for space heating, domestic water heating, lighting and operating applicances, are presented.

1. INTRODUCTION

Using plants as ecological structures adds up to biodiversity which should be set at the most advantageous level. Generally, flora (and fauna) is considered a natural heritage of scientific, cultural, ethical and intrinsic values, which fact behoves us to safeguard it, and hand it on to future generations. In the paper solar construction as a practical way of designing and building homes and other farm objects to live in and work both comfortably and economically, using techniques which reduce energy requirement for space heating, domestic water heating, lighting and operating appliances are presented.

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2. BASIC PRINCIPLES OF SOLAR CONSTRUCTION DESIGN

2.1. 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 climate at the site. Taking advantage of these factors in adapting the design of the building is a fundamental principle of solar construction. Climate varies from one region of the country to another and from one site to another within this same region. The combined influence of different climatic factors greatly affects the ability of a building to shelter its inhabitants (figure 1). Builders are familiar with using maximum/minimum temperatures and degree-day figures to size both active and passive solar heating (and eventually cooling) systems [1], [2].

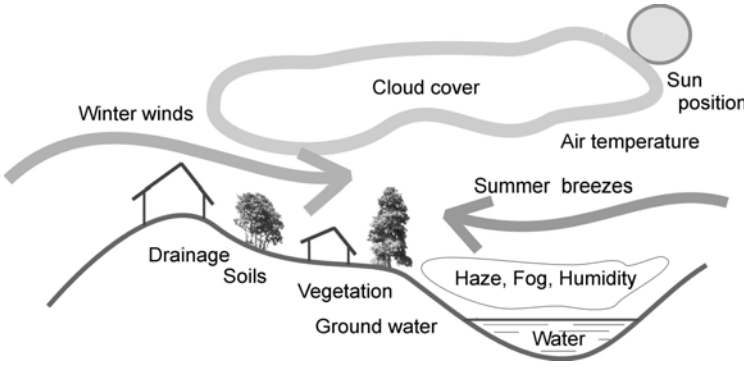

Fig. 1. Typical climatic elements at a building site

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, and cost related to all phases of construction. The topography can create colder or warmer building sities. Wind speed at the top of a slope may be by 20% greater than that measured on a flat site, with the conditions being the same. Another "cold site" forms at the foot of long open slopes and in hollows. Colder air collects in lower areas and can form morning ground fog. For reasons of economy of energy consumption, the best location for any building 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.

When locating a building on a site one must also take aesthetic values into account. These include noise, privacy, and access to views. Besides its usefulness as shade and

wind control, vegetation can also serve as a buffer against noise from roads, neighbours, or industrial processes. Landscape planning can also 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 [3].

2.2. VEGETATION

All microclimatic conditions are influenced by plant cover (figure 2). Plants increase surface for radiation and transpiration, shade the ground, and slow down air movement, resulting in a cooler, more humid and stable microclimate.

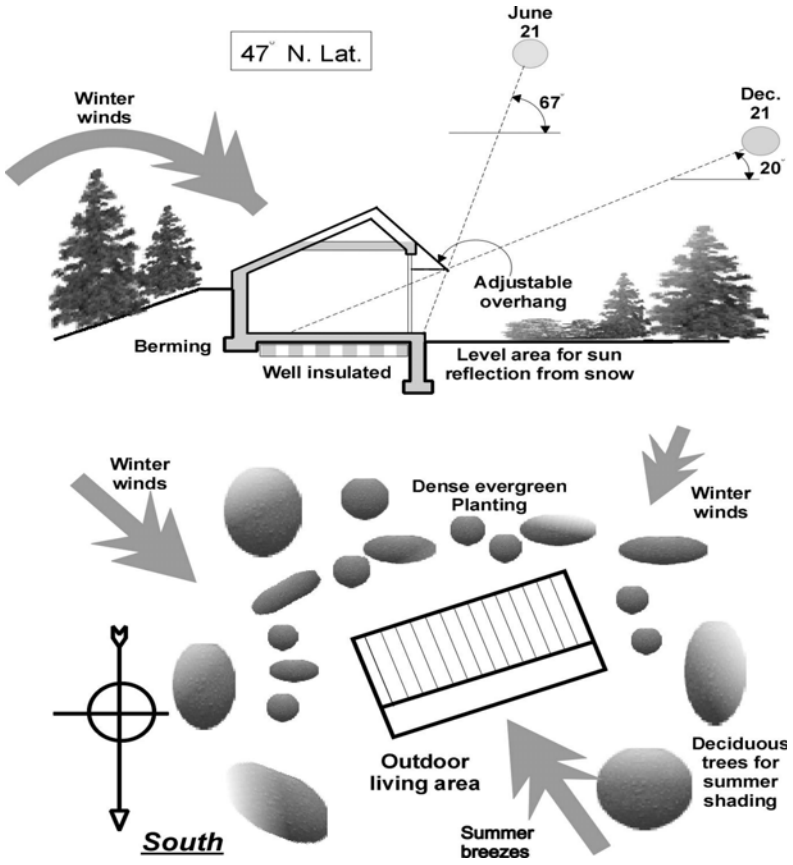

Fig. 2. The placement of the building on its site

Belts of shrubs or trees can be used effectively as windbreaks reducing wind speed by more than 50%. Grass or wet grounds tend to stabilize temperature extremes and

soil structure at a site. Moisture increases the conductivity of 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 (figure 3). Organic residue is transformed by worms, bacteria and fungi into humus, which is an essential element of fertile soil.

Using plants for creating ecological corridors adds up to biodiversity which should be set at the most advantageous level [1]. Generally, flora (and fauna) is considered a natural heritage of scientific, cultural, ethical and intrinsic values, which fact behoves us to safeguard it, and hand it on to future generations. Ecological corridors sometimes cross the borders and need international cooperation.

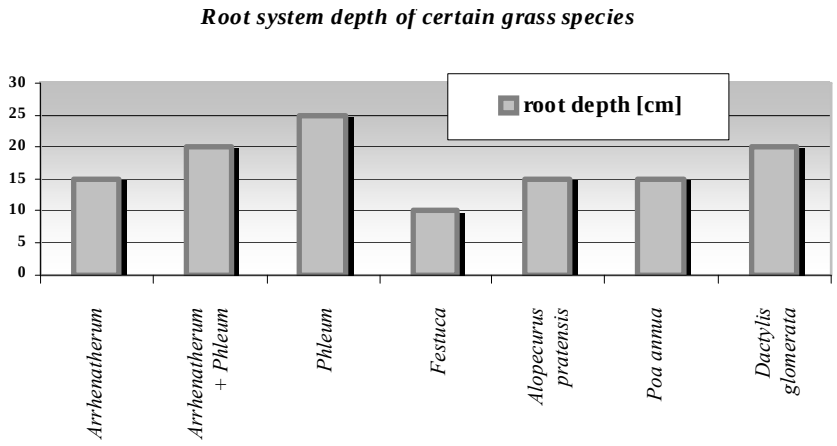

Fig. 3. Species biodiversity on a lawn pool as a favourable element of environment

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.

3. CONCLUSIONS

The 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. Actions have to be undertaken at the outset and not merely attempt to rectify the adverse effects of these areas of activity after the fact. Integration of environmental policy 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. The 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.

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RÓŻNORODNOŚĆ BIOLOGICZNA KRAJOBRAZU W KONSTRUOWANIU SYSTEMÓW SŁONECZNYCH

Organizacja terenów zielonych jako struktur ekologicznych sprzyja różnorodności biologicznej dzięki przyjęciu stosownego poziomu założeń co do projektowanych form. Lokalne formy florystyczne stanowią wraz z fauną naturalne dziedzictwo naukowe, kulturowe, etyczne oraz materialne. Złożony układ czynników klimatycznych wpływa równie znacząco na kształt architektoniczny budowli, jak i na komfort mieszkańców. Polityka środowiskowa samo w sobie nie decyduje w wystarczającym stopniu o osiągnięciu celu, jakim jest zrównoważony rozwój. Istotne jest zatem włączenie do niej zasady wykorzystania ekologicznego bogactwa form i środków w obszarze poszczególnych dziedzin gospodarki, tj. przemysłu, transportu, rolnictwa oraz urbanistyki.

W artykule przedstawiono praktyczną ideę wykorzystania systemów słonecznych w realizacji obiektów spełniających oczekiwania użytkowników co do komfortu oraz redukcji zapotrzebowania na energię do celów gospodarczo-bytowych.