

Green roofs advantages and disadvantages



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Introduction

A Green roof is a roof of a building that is partially or completely covered with live vegetation. The vegetation is usually planted over a waterproof material. The green roof does not refer to the rooftops that are merely colored green. Green roofs may also include additional layers of root barriers and irrigation systems. In the case where plants are grown in pots and then placed in roof tops, these are not considered to be true green roofs. Roof top ponds are another form of green roof and are used to treat grey water (Little, par. 1). Grey water is any water that has been used in the home for the purposes of washing except water from toilets. Water from laundry, sinks and showers is all referred to as grey water. This water usually goes to waste but it may be reused for other purposes, especially irrigation. Grey water may therefore be run to roof gardens. Green roofs are also referred to as roof gardens and eco-roofs. Little says that roof gardens serve several purposes for a building such as absorbing rainwater, providing insulation for the building, creating habitat for wildlife, and also lowering urban temperatures thus lowering the heat island effect (Little, par. 1).

There are two types of green roofs: intensive green roofs and extensive green roofs. Intensive green roofs are thicker and can support a wider variety of plants. They are heavier and require a lot of maintenance. They are made in such a way that they are accessible. The other type of green roofs is called extensive green roofs. These types of green roofs are covered by lighter vegetation and are easier to maintain than the intensive green roofs. They are mainly developed for aesthetic purposes, but also have various advantages to the environment.

Green roofs can also be used to refer to the types of roofs that can use some form of green technology such as cool roof with photovoltaic modules.

Photovoltaic modules are interconnected assembly of solar cells. The main purpose of the solar panel is to convert the solar energy into electricity.

Environmental advantages of green roofs

Population growth in the world today is happening at a very rapid rate. Many cities in the world are rapidly becoming highly urbanized with the construction of buildings and structures in close contact with each other. Increased construction of concrete buildings has led to the loss of green cover thereby creating a lot of environmental issues such as urban heat island effect. This has generated a substantial increase in air temperature in urban areas. The energy consumption has increased as an outcome of the heat island effect. Plants and vegetations play a very vital role in trapping dirt and dust particles in the air. Plants also utilize carbon dioxide in the process of photosynthesis and generate oxygen and glucose molecules during the day. This helps in reduction of carbon dioxide in the air as well as increasing the amount of oxygen in the air. In the process of urban development, trees are cut down at a very high rate. This leads to lowering of the air quality as levels of carbon dioxide will increase and oxygen levels decrease. According to Dowdey (para 3), places where there are no rooftop gardens, rainwater flows very fast from the buildings' roofs into the sewer and in cases where the sewer cannot cope with the amount of water flowing from the roof tops, floods occur .

The main cause of island heat effect in the urban areas is the absorption and retention of solar heat in buildings and other concrete structures resulting in

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the air temperature in such areas becoming warmer than in the rural areas. Increase in temperature means that the air conditioning load of these buildings will have to be increased. This means that more energy will be needed by the conditioners which will in return release more warm exhaust air into the outdoor thus aggravating the urban heat island effect. Roof gardens have been shown to lower the surface temperature and the air temperature greatly. Little states that the main reason why green roofs lower these temperatures is because, they cover the heat absorbing surfaces of the roof tops as well as the evapotranspiration cooling effects of the plants.

Improving Air quality

Roof vegetation improves the air quality by acting as a filter to trap air borne dust particles. A roof that has got a high temperature tends to create a thermal draft attracting dust particles from the streets. The green roofs have been found to moderate the thermal draft thus reducing the temperature difference between the roof tops and the streets. Green roofs also help to reduce the formation of smog. Smog is very sensitive to high temperatures and the fact is the higher the temperature, the higher the concentration of smog. According to Dowdey, plants through the process of photosynthesis absorb carbon dioxide and release oxygen into the atmosphere thus improving the air quality (Dowdey, par. 4).

Improving water quality

The green roof helps to filter out most of the heavy metals and nutrients present in rainwater. This is very beneficial in urban areas where precipitation is collected for domestic usage.

Reduction of storm water

Roof gardens retain most of rainwater on the roof through the various layers and significantly reduce the peak discharge flow rate into the storm water drainage system. This helps to reduce the risk of flash flooding.

Energy conservation

When surfaces absorb a lot of solar heat, urban heat island is the resulting effect. This in turn causes a substantial increase in the atmospheric temperature within the urban centers. This will in turn lead to a lot of energy consumption for cooling loads. Roof gardens help to absorb a lot of solar heat that would otherwise increase the atmospheric temperature. Cooling loads will therefore not be required to such a great extent and hence reduction in energy consumption will be the beneficial outcome. Green roofs also help in reducing heat loss and energy consumption in winter conditions (Kuhn, p 5).

The green space

Green spaces are very beneficial to people living and working in the urban centers. These spaces help in supporting biodiversity, softening the building's environment, and aiding peoples' mental and physical health. Green roofs improve the value of the green space by providing accessible

green space. Green roofs are very appealing to those who look at them. Some green roofs can be designed for people to enjoy (Dowdey, par. 7).

Cost benefit

If 50% of the roofs in Tokyo were covered with roof gardens, a study showed that air temperature could be reduced from between 0. 11°C to 0. 84°C.

Translation of these figures into real dollar value estimated that about \$1. 6 million per day in electricity bill could be achieved as energy savings. Kuhn (p 6) states that about 15% of annual energy saving can be achieved with roof gardens. Cooling loads can be drastically reduced up to 80% resulting in downsizing of air conditioning systems which would greatly improve savings in capital investments. A reduction of peak roof thermal transfer value of up to 80% make the roof tops a viable substitute for thermal insulation.

Extension of roof life

According to Dowdey, roof gardens protect the water proofing membrane as well as the roof top surfaces from the harmful effects of the ultra violet rays. Most of the water which would normally reach the roofing material causing dampness and rust is either taken by the plants or retained by the water proof membrane (para 8). Protection of the water proofing membrane and the roofing material extends their life to about four times their average life. The water proof material and the roofing material itself will not be tampered with in the process of regular replacement. This greatly improves the life expectancy of the roofing materials. Green roofs also play a very important role in protecting roofs from human traffic, heavy debris and dust particles.

This means that the roofs are safe from being tampered with by people (Dowdey, par. 9).

Disadvantages

Proper planning for the installation of a green roof greatly reduces the disadvantages that may be accompanied with it. However, some types of green roofs do have more demanding structural standards than others. Some existing buildings cannot be retrofitted with certain kinds of green roofs because of the weight load of the substrates and the vegetation which exceed the permitted static loading, also referred to as the external force applied to a fixed position for a specific period of time. Depending on the type of the green roof, the cost of maintenance could be high. Some types of green roofs especially the intensive green roof require a very strong water proofing material to prevent water and roots from penetrating the water proof membrane. Installation of adequate water proofing materials and root barriers requires a considerable amount of money. The vegetation on the gardens requires special fertilizers which can sometimes be very costly (Kuhn, p 7).

Conclusion

Green roof are therefore very beneficial to human not only in terms of environmental protection but also in terms of economy. Their advantages are very many as compared to their disadvantages. The roles played by green gardens have a very great impact in our lives. Modification of the environment through lowering the island heat, managing storm water, reducing air and water pollution and creating a wildlife habitat are some of

the green garden's environmental benefits. Green roofs have also been shown to increase the roof life as well as reduce energy costs. Bearing in mind the benefits of the roof gardens, the cost factor may be looked at the least in order for roof gardens to be widely adopted.

Reference:

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