ARJUN KAMAL

GROUNDWATER POLLUTION: RAIN GARDENS AND BIOSWALES TO THE RESCUE

Rainwater pollution, and hence, ground water pollution can cease to be a bane. All we need are rain gardens and bioswales to filter pollutants present in rainwater

Water is vital to the economic and social development of any country. Water scarcity and groundwater pollution are issues being faced by every city in India. Ironically, according to global standards, India receives abundant rainfall. So, where is this 'abundant' water disappearing? Let us investigate.

The problem lies in rainwater getting polluted and hence, causing groundwater pollution. Urbanization has led to the creation of impermeable surfaces like building rooftops, pavements and roads. Such surfaces do not allow rainwater to percolate into the ground. During rainfall, water flows from the rooftops of buildings and paved areas, washing away dirt, dust and pollutants, thus getting contaminated. This runoff enters storm-water drains.

These storm-water drains often lack maintenance and get choked during the monsoons because of accumulation of garbage. Rainwater that could have gone through these drains accumulates on roads, causing water-logging.

The runoff pollutes natural bodies too, as seen in the rivers like Yamuna and Ganga. The pollutants also enter the ground, thereby contaminating our groundwater.

Fig. 1: Pollution of rainwater and ground water: A major concern in Indian cities

We all know that construction of rainwater harvesting pits has become compulsory in all newly constructed buildings having a plot area of more than 200 sq m. The initial rainwater, which contains pollutants, cannot be stored in the rainwater recharge pit. This is where the rain gardens and bio-swales come into the picture, to help filter the pollutants in the rainwater.

So what exactly is a rain garden? A rain garden is a shallow planted depression which captures rainwater and allows it to seep into the ground.

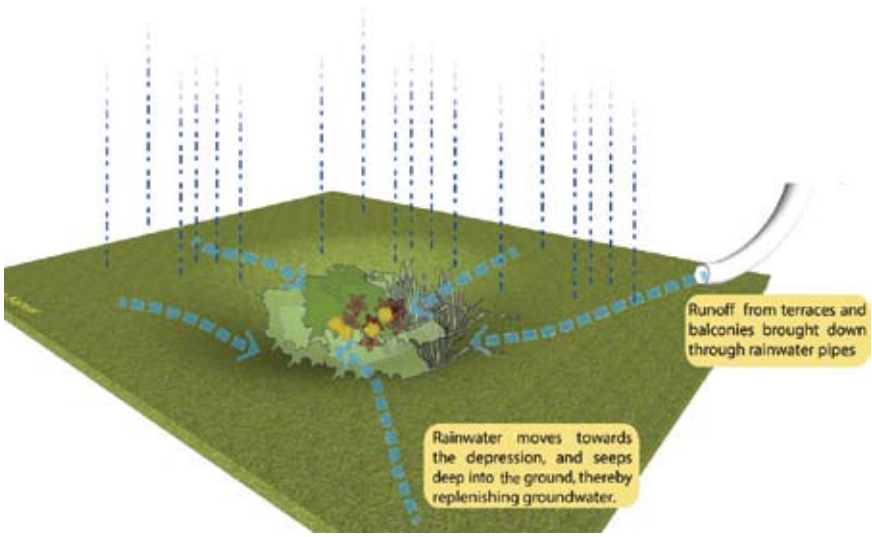

Fig. 2: Rain gardens help replenish ground water

Merits of rain gardens

On an individual level, this may appear insignificant but on a larger scale, the results can contribute towards a healthy environment.

i) Rainwater, which otherwise flows as surface runoff, causing erosion, flooding and reduced groundwater recharge, is captured and allowed to seep into the ground.
ii) As captured rainwater seeps into the ground during rainfall, pollutants, such as pesticides, oil spills and volatile organic compounds, are broken down by microbes.
iii) There is a decrease in runoff, which also brings down the load on the local municipal drainage systems.
iv) Flooding levels are reduced.
v) Rain gardens can absorb up to 30 per cent more water than conventional lawns.
vi) Rain gardens require low maintenance as they consist of native plant species, which can withstand long periods of accumulated water, like doob grass, Sheesham (Dalbergia sissoo), Kaner (Thevetia neriifolia) and Sacred Lotus (Nelumbo nucifera).

Location of rain garden

While deciding the location of your rain garden, analyse some key points about your site:

- What is the natural course of rainwater drainage?
- Where is the maximum slope?
- Where are the down spouts from

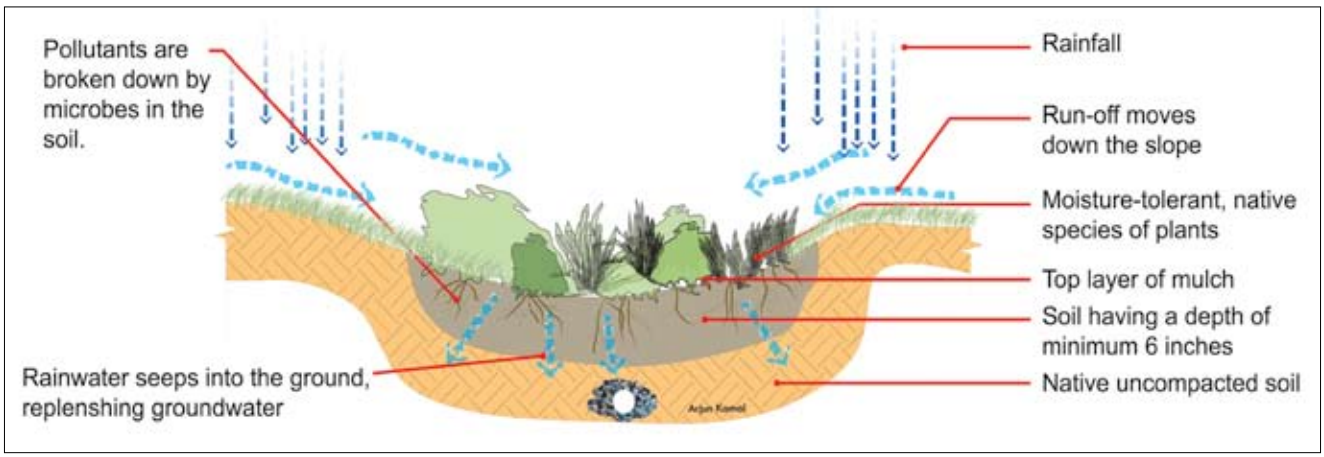

Fig. 3: Cross-section of a rain garden

your terraces leading to?
- Are there any underground services?

Components of a rain garden

A rain garden comprises the following:

i) A layer of crushed stone at the bottom level for drainage
ii) A layer of nutrient-rich porous soil above, which acts as a growing medium
iii) A layer of geotextile fabric between soil and crushed stone, to prevent soil from choking the air-spaces between the stone pieces.

Bioswales

Bioswales work on the same principle as rain gardens. Unlike rain gardens, which are depressions, bioswales are channels, planted with the same hardy, water-tolerant species as that for rain gardens. They are more suitable for storm-water control on a larger level. They can be made along the roadsides so that rainwater from the road flows towards them and percolates into the ground.

Controlling groundwater pollution through vegetation is a strategy being widely used in countries like the USA and Germany. It is high time the concerned authorities in India start implementing such methods to save precious water from going down the drain. ■

Arjun Kamal, B.Arch; Assistant Professor, Apeejay School of Architecture and Planning; Pursuing M.Arch. in Landscape Architecture.

Illustrations: Courtesy, author.

Fig. 4: Bioswales along roadsides