12 URBAN GARDENS IN EUROPE
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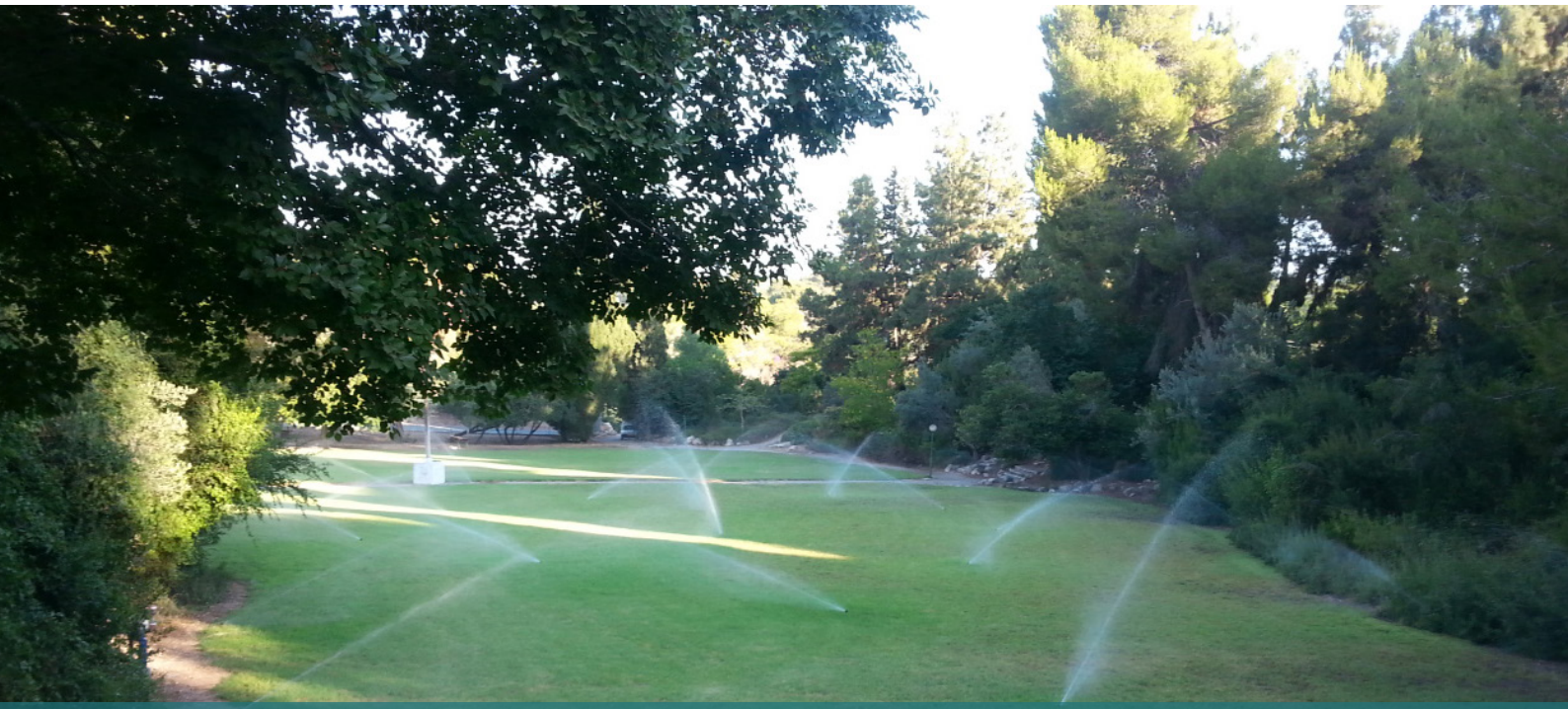

HOW TO IMPROVE WATER MANAGEMENT IN URBAN ALLOTMENT GARDENS?

Challenge

Heavy rainfall events, scarcity, reduced availability, inefficient use and low quality are water-related threats commonly reported in urban areas, which also affect soil and vegetation conditions. For example, in Urban Allotment Gardens (UAG) of the Mediterranean zone, where typical seasonal weather conditions (extended seasonal dry periods) lead to irrigation requirements for plant growth, over-watering often occurs. This problem may be caused by operational decisions associated with limited technologies (e.g. manually application with watering cans), bad systems/design (i.e. not ensuring uniformity of water distribution), or poor scheduling (e.g. water amounts exceeding soil storage capacity). Thus, there are risks to UAGs sustainability involving the waste of water, soil and nutrient losses, damage to vegetation, physical restrictions to habitats and recreation activities.

What challenges sustainable urban allotment gardens are facing regarding water management?

Concerning the complexity of climate and soil-water issues, there is a particular need for addressing challenges over water use and irrigation. Climate change and/or the water cycle variability must be considered. In many regions the weather is strongly affected by uncertainty due to the high variability of rainfall and evapotranspiration (evaporation + transpiration of plants). Such conditions, observed in time (frequency, intensity and duration) and space scales, are producing increasing negative impacts on cities, namely, related to floods and erosion, drought seasons and water scarcity, extreme temperature ranges, urban heat island, water quality, etc.

Image 1 (above) - Sprinkler irrigation operating efficiently. Photo: Dror Nisan

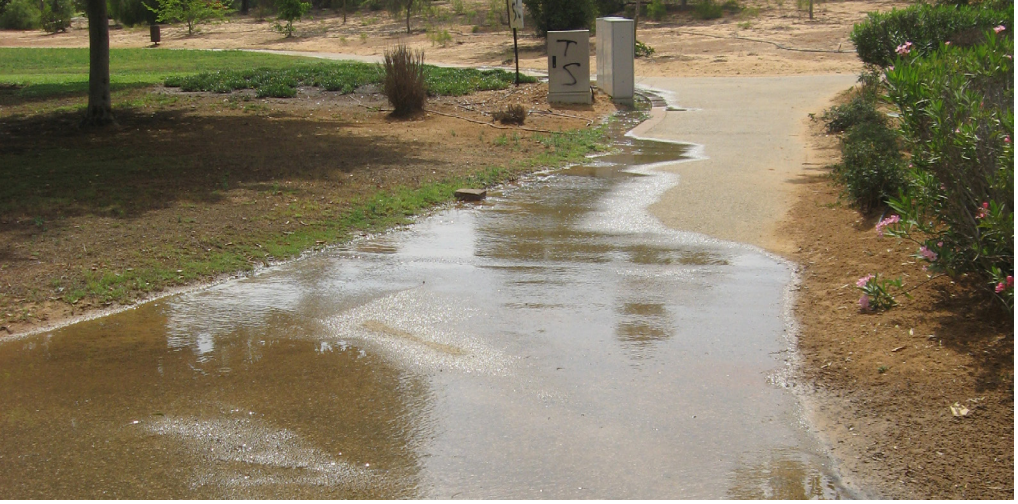

Image 2 - Water logging due to an inadequate design and/or operation of the irrigation system in a slope area. Photo: Avigail Heller

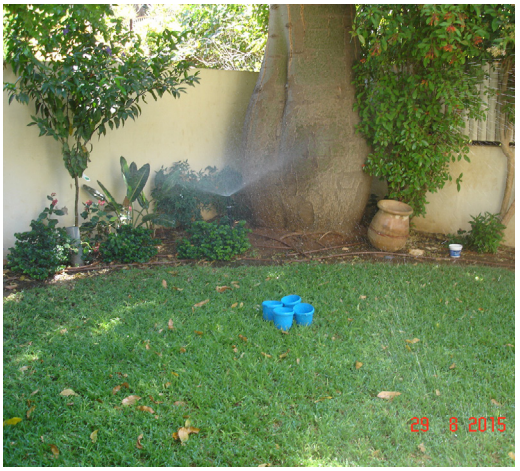

Image 3 - Testing the irrigation of the installation quality[1]. Photo: Dani Katz

Message to Gardeners

UAGs with rainwater harvesting systems

The excess water from land and building surfaces may be collected, diverted and stored (e.g. reservoirs, ponds) and later applied when irrigation is required.

Systems adaptation shall be evaluated with respect to various factors, such as: size-space combination, technologies to be adopted on water (e.g. distribution pipes, filters, pumping and tanks) and energy (e.g. renewable or from gravity-based structures).

UAG with irrigation systems

Irrigation amounts and intervals can be controlled through local meteorological data of evapotranspiration and rainfall (current and forecast) or soil sensors.

Apply irrigation only when the soil appears dry (inserting fingers and sensing humidity below 2-3 cm), avoiding shoot wetting to reduce diseases and pests. Avoid watering during central hours of the day.

Plant observation, early in the morning, will provide information on water status. At noon plant dehydration is not necessarily a symptom of water stress.

UAG with drainage systems

Heavy irrigation or rainfall may lead to soil saturation, water logging and runoff conditions, causing damage to plants (as drowning crops, diseases, root asphyxia) and soil (e.g. erosion, lack of aeration).

Advice Note

1. Gardener plan

A preliminary inventory with site-specific data, comprising crops, soil and climate characteristics, is needed for reliable design and management of water-related systems. A set of parameters such as: soil compaction, pH (contamination) or electrical conductivity (salinity) are crucial at planning level.

A proper plan must compare project alternatives regarding benefits and costs-budgets. For best performances pressurized micro-irrigation technologies are available. FAO proposes low-cost and automated (e.g. timer) solutions as "affordable micro-irrigation techniques".

2. Gardener Actions and Practices

UAG site parameters can be evaluated by means of monitoring and periodic evaluations, using portable devices or sending samples to a laboratory.

In light soils with shallow root systems, irrigation should be small and more frequent. To avoid runoff, application rates of irrigation system emitters are lower in heavy soils.

In semi-arid, Mediterranean or continental with dry periods climates, the predicted water needs to recover evapotranspiration at the warmest months shall range between 5-10 mm/day (5-10 L/m2 per day).

Drainage layers, drain pipes and holes, and systems of channels are available technologies, which may provide the possibility for diverting water to storage infrastructures.

Learn More

Useful links

http://www.urban-agriculture-europe.org

http://efotg.sc.egov.usda.gov//references/public/NE/NE_Irrig_Guide_Index.pdf/

http://www.hortis-europe.net

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[1]comparing the water amount measured in catch containers.

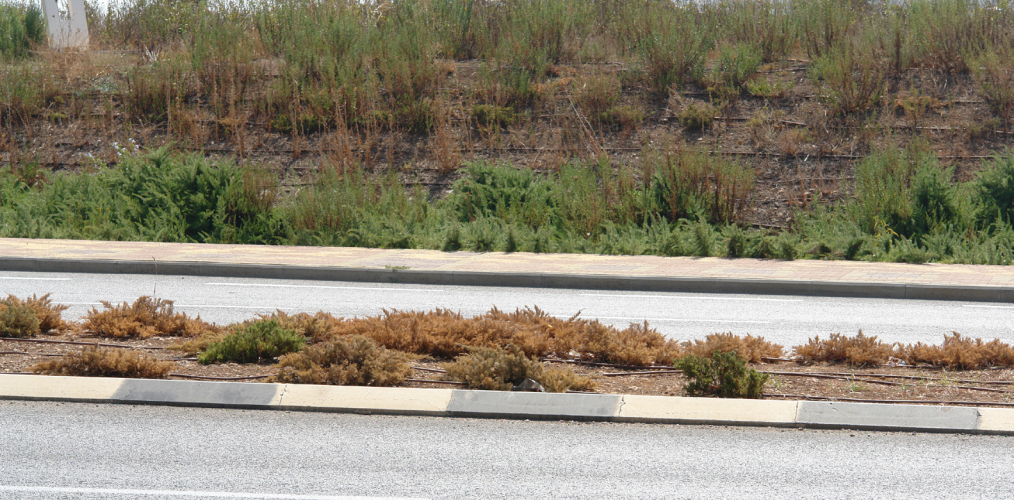

Image 4 - Water shortage problems. Photo: Avigail Heller

Image 5 - Micro-Irrigation System timer. Photo: Avigail Heller and Dror Nisan

Message to Policy Makers

Important objectives regarding UAG development include the improvement of ecosystems (e.g. soil-water regulating and habitat services) and issues of health, recreation and food production. If negative impacts threaten UAG structures, habitats and land, protection measures should be introduced. As a practical example of sustainability and multi-functionality, "terracing work" is a land levelling practice which improves surface slope and water harvesting conditions.

Management strategies and measures to address UAG water related ecosystem services:

- Help people accessing water, provide water storage facilities for rainwater collection or supply gardens with treated wastewater suitable for irrigation.
- Integrate UAGs within plans for city climate change resilience, focusing on water shortage, scarcity, and storm and flood management.
- Promote dissemination campaigns on sustainable water management, addressing water-energy saving, pollution control, food production and public health and their relationship with pressure on freshwater demand.
- Bring together decision makers (e.g. public authorities, water supplier) and stakeholders (e.g. gardeners, irrigation suppliers) into dedicated water governance forums, aimed at improving water use efficiency in UAGs.

Policy Brief

- Apply innovative policies for resources use efficiency (e.g. promote micro-irrigation systems, drainage projects, water storage facilities and renewable energy sources). The implementation of projects should be technically reliable and economically affordable. Concerning water management, when the user has an inadequate knowledge of site conditions and constraints, or there is a lack of regulatory issues, the environmental degradation risk is increased (e.g. erosion, water pollution, soil contamination, salinity/sodicity).
- Implement monitoring, evaluation and warning services, to support gardeners decisions on irrigation management (when and how much to irrigate) e.g. meteorological or soil moisture information.
- Provide tools for planning, training and expertise support, regulation, use standards and certifications.

Reduce urban water use vulnerabilities:

- Water savings due to technological and behavioral change.
- Reduce diffuse source pollution.
- Improvements in irrigation efficiency.
- Adaptations (people and technology-based) in areas subject to flood and/or drought risks to improve resilience.

Learn More

Useful links

http://www.eea.europa.eu/publications/water-resources-across-europe

http://ec.europa.eu/environment/water/quantitaty/good-practices.htm

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