

## Irrigation on Extensive Green Roofs - Facts Study

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The main purpose of an extensive green roof is stormwater retention and delaying stormwater runoff amongst many other added values.

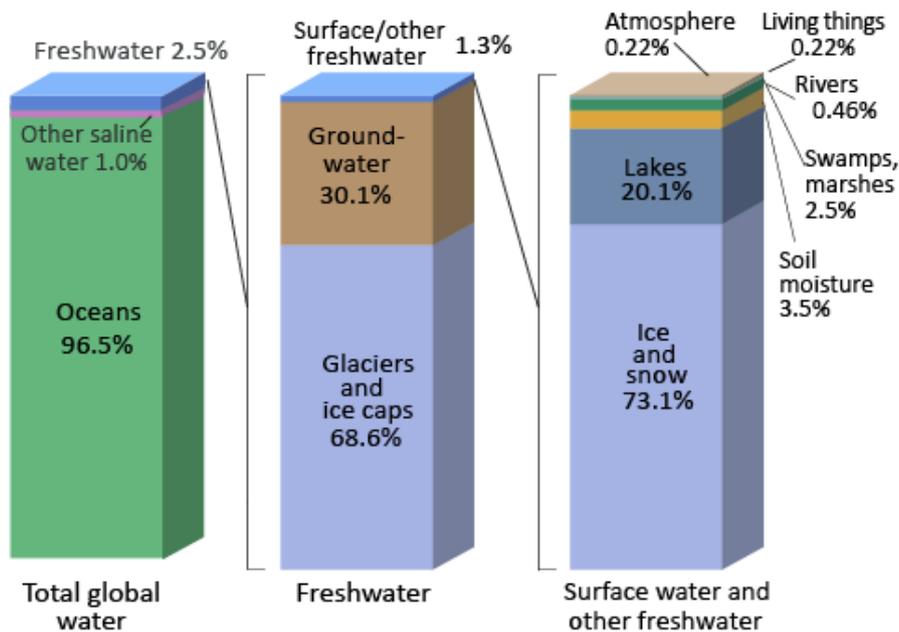


A permanent irrigated extensive Green Roof with sprinkles – most inefficient and most plants destructive solution. Photo: Jörg Breuning

In the last decade, I've seen many green roofs where the intended plants never really flourished. I estimate that in the US at least 50% of the green roofs are not performing to their fullest potential. This can be observed by simply looking at the most obvious of indicators, the plants themselves, regardless if they were planted on purpose or somehow found the space to take root. Most of these less healthy extensive green roofs are pre-planted boxes, or commonly known as modular systems. Not only are these systems much more costly, the mid to long term results are often far below systems that are assembled in place and at the time of installation. I know that the transition from being a common nursery-grown plant (including pre-planted boxes) to the extreme environment of a rooftop poses severe challenges. Green roof plant nurseries typically have "great" advice and recommend the installation of temporary or more often permanent irrigation systems. This advice is defeating the purpose of an extensive green roof and shows that asking self-appointed experts can cause a spiral of failures. Since many green roof installers lack the proper horticultural knowledge, they may not be able to identify problems by simply looking at the indicators. This could cause the problem to gain momentum.

In addition, the false conclusion that technology (Google search, Apps, synthetic growth media or sophisticated soil moisture control devices) can fix the problem supports my theory of less experienced or misinformed green roof professionals. They rely heavily on technology to fix any issue and miss the big picture. Nature has the ability to take care of itself, as long as the appropriate design, materials and plants are used in addition to being familiar with the immediate climate.

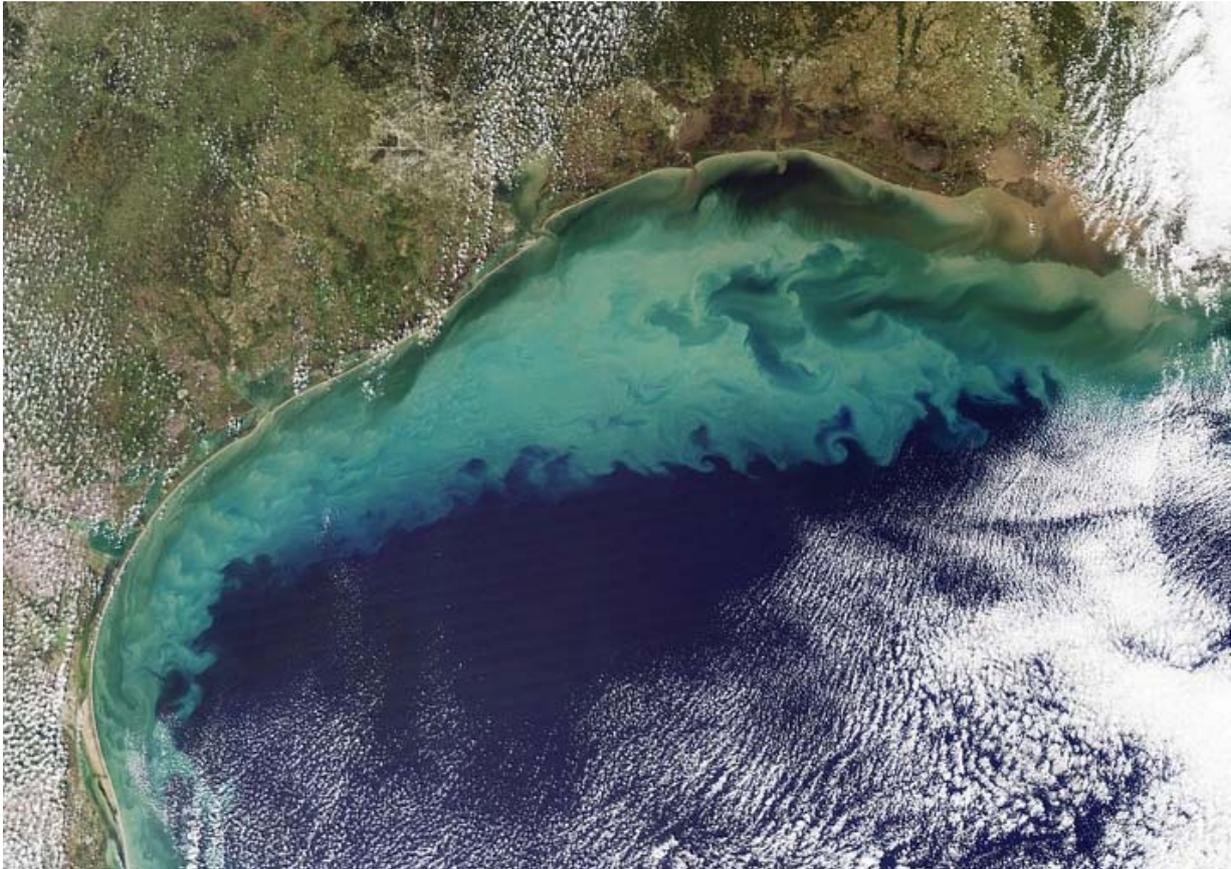
## Where is Earth's Water?



Source: Igor Shiklomanov's chapter "World fresh water resources" in Peter H. Gleick (editor), 1993, *Water in Crisis: A Guide to the World's Fresh Water Resources*. (Numbers are rounded).

Only 1.73% of all water on earth is usable fresh water (Wikipedia), 70% of this little water is used for irrigation in agricultural/horticultural and it is distributed very unequal on Earth. At this point, it does not matter whether it is a rooftop farm, organic food farm, a conventional farm on the ground, landscaped area or a green roof. Getting the water from the source to irrigation system requires gigantic efforts like super powered pumps, endless piping, canals, dams and sophisticated logistic and politics. The consequences of irrigation can spread from irreparable ecological damages (artificial lakes destroy natural habitat), wars, high carbon footprint and consistently lowering ground water tables (more irrigation is required).

Another major problem of irrigating agricultural/horticultural land is the tremendous impact on the natural water retention of soil: An irrigated area has higher moisture content and consequently less ability to retain water. For example, the runoff from agricultural/horticultural land is the leading source of impairments to surveyed rivers and lakes (EPA).



Farm Runoff in Mississippi River Floodwater Fuels Dead Zone in Gulf

<http://www.pbs.org/newshour/rundown/2011/05/the-gulf-of-mexico-has.html>

This is evidence enough that commercial growers (farmers –especially for bio-fuels-, nurseries), LEED™ experts or green roof professional that utilize irrigation might not have the right approach to farming, landscape design or modern green roof technology for extensive green roofs.

Rain-fed farms or so called dry farms can reduce water consumption on the commercial grower side but green roof designers also need to understand that any commercial production of a crop is done with the intention of selling it in the shortest time as possible. An owner of an extensive green roof however wants to keep his “crop” as long as possible – actually never wants to sell it and investing the least maintenance with it. What a conflict of interest and all the experts and academics in the North American green roof industry haven’t that found out yet. Vice versa if you ask them for advice, you might not get the answer you are looking for.

Green roof designers and green roof professionals must understand that less technology is often more when it comes to extensive green roofs and that no building owner wants to irrigate the roof in short, mid or long terms. There is no need to make a green roof more complicated (and water needy) by using multiple synthetic or plastic layers. When LEED™ certification supports using gray (recycled) water for green roof irrigation or recycled components that are not needed; they missed the point of an extensive green roof system retaining as much stormwater as possible.

Common sense is, understanding the main purpose of extensive green roofs, the problematic that comes with irrigation and environmental awareness combined with extensive horticultural experience. These are the only things that will aid in planning the perfect green roof.



Above: Un-irrigated self-established Green Roof in arid climate zone (might need some structural support)

Implementing irrigation on an extensive green roof is a clear sign of not understanding the basic principles of horticultural techniques or the laws of nature. Irrigation reduces the water retention, increases the nutrient pollution in runoff and requires higher fertilization application. Irrigated extensive green roofs are not environmentally friendly, not economically feasible and have hardly any payback for the building owner if the true costs of water are considered.

I tell my clients if they have an offer or design for an extensive green roof that includes irrigation - be cautious!

#### Readings:

German:

<http://de.wikipedia.org/wiki/Bew%C3%A4sserungsfeldwirtschaft>

English:

[http://en.wikibooks.org/wiki/High\\_School\\_Earth\\_Science/Problems\\_with\\_Water\\_Distribution](http://en.wikibooks.org/wiki/High_School_Earth_Science/Problems_with_Water_Distribution)

<http://en.wikipedia.org/wiki/Irrigation>

[http://water.epa.gov/polwaste/nps/agriculture\\_facts.cfm](http://water.epa.gov/polwaste/nps/agriculture_facts.cfm)

Short version:

<http://www.greenrooftechology.com/blog/green-roof-blog/post/irrigation-on-extensive-green-roofs/>

PDF: