i-Tree - ecosystem services of urban trees

Andrea Gion Saluz
Research Associate,
Planting Design Research
Group,
salu@zhaw.ch

Planting Design Research Group

Fig. 1: The pressure arising from human activities and the reflection of thermal radiation from urban infrastructure will continue to increase in the future. Climate-adaptive planning ensures that trees are able to grow to full maturity. (Daniel Bösch, ZHAW)

The "i-Tree" software programme, which was developed in the USA, enables a quantitative assessment of the ecosystem services of urban trees and forests to be made and these to be given a monetary value. The programme, financed by the Federal Office of the Environment, is being implemented for the first time in Switzerland using Swiss climate and population data. The data recorded pertaining to ecosystem services form the basis for the development of instruments for the sustainable planning of urban green spaces.

Urban trees and forests
Urban green spaces, and especially urban trees, are of increasing importance and usefulness to society, be it due to the aesthetics of a mature tree, the increase in well-being or the climate-adaptive ecosystem services. The latter will continue to grow in importance, due to the effects of climate change. In urban locations, trees only achieve around 25 percent of their potential lifespan, which is problematic because trees only reach their full ecological potential after 50 years. The project presented here provides analytical tools and recommendations that can lead to a more adaptable, sustainable, and therefore more durable, urban ecosystem. The development of climate-adaptive management strategies for urban trees and forests is forward-looking. The basis for this is a comprehensive knowledge of their ecosystem services, i. e. benefits that humans can directly gain from the environment. In the case of urban trees, this includes filtering air pollutants, evaporation rates as well as providing shade and the associated temperature reduction.

The i-Tree programme
The i-Tree programme is used to document these ecosystem services and to process the necessary data. i-Tree is a peer-review software programme (2006) developed in the USA, which can quantitatively calculate and illustrate the ecosystem services of trees. Basic data from qualitative and quantitative recordings of trees recordings, as well as climate and population density from the respective countries, are used for the calculations. This ensures local and individual calculations leading to sector-specific approaches. The ecosystem services of the trees can be quantified and given an equivalent monetary value using selected parameters.

Implementation in Switzerland
The "i-Tree" – climate-adaptive management of ecosystem services of urban trees and forests project will work on the basis of six pilot cities. The project quantifies and gives a monetary value to climate-relevant ecosystem services of urban trees and urban forests. Specific parameters and fundamentals of these cities are examined, the ecosystem services are recorded, modelled and processed in a target group-specific manner in order to derive a climate-adaptive management approach. The results serve to help develop implementation strategies. These strategies take into account the needs of urban trees as well as those of society and the economy in the face of today's challenges, e. g. climate change or cuts in the maintenance budget of green spaces. With i-Tree's economic basis of argumentation, political and economic developments can be influenced and sustainable planning concepts launched and consolidated. The monetary evaluation of the services and functions of urban trees using the same methodology is a novel approach and can be used in various forms.

Outlook
Initial results are expected at the end of 2020. The project, on the basis of i-Tree, provides the opportunity to develop such planning concepts in Europe for the first time. This approach can also be seen internationally as a model. In view of the need for international cooperation (action plan 2014 to 2019 to adapt to climate change in Switzerland), this project thus makes an important contribution to the international exchange of experience. ∎

Fig. 1: "Cause We Care" is committed to more sustainable tourism. Photo: © Frank Brüderli

Climate Protection in a World Heritage Site

Simone Gruber
Research Associate, Tourism and Sustainable Development Research Group, grub@zhaw.ch

Climate change is particularly noticeable in tourism. We perceive the changes in the landscape when traveling, while at the same time, tourism contributes to these changes. It causes CO_2 emissions, especially upon arrival and departure, transportation and engaging in local activities. The myclimate initiative "Cause We Care" ➔ **causewecare.ch** is committed to curbing these negative effects on the climate. It makes it possible to offset CO_2 emissions caused by tourism while at the same time supporting sustainable activities undertaken by local tourism companies. The idea is that tourists and companies act jointly to reduce greenhouse gases and make tourism more environmentally sustainable. The guest makes a voluntary contribution that is matched by the tourism company, thereby doubling the overall contribution made. Both flow into a fund that supports both myclimate climate protection projects and the operational sustainability of tourism companies. Since the start of the pilot phase in 2017, 345'000 climate-neutral bookings have generated CHF 455'000 in Switzerland. The ZHAW Tourism and Sustainable Development Research Group provides scientific support for "Cause We Care" and develops recommendations for further advancement of the climate protection initiative. ■

A "Green Hospital" is on its way

Karen Muir
Research Assistant, Life Cycle Research Group, muir@zhaw.ch

Regula Keller
Research Associate, Life Cycle Research Group, kelg@zhaw.ch

From an environmental perspective, the health sector is the fourth most important consumer area in Switzerland. But which processes in a hospital are particularly environmentally-relevant and how can they be made more environmentally-friendly? The "Green Hospital" project combines environmental assessment with practical knowledge and implements concrete measures in conjunction with partner hospitals. In autumn 2018, the data for a comprehensive environmental assessment was collected in two hospitals. The results show that infrastructure, food, heating and electricity consumption are the most polluting aspects. Wastewater, refuse and the requirement for medical consumables and medicines are also relevant. Other areas, such as paper consumption, are insignificant from an environmental perspective. In order to estimate the results across Switzerland, an online survey was sent to all Swiss acute care hospitals. The evaluation of the survey will be published next year at ➔ **greenhospital.ch**. The project is part of the National Research Program "Sustainable Economy" (NRP 73) of the Swiss National Science Foundation (SNSF). ■

Total environmental impact per area	
Building infrastructure	!!!!
Catering	!!!
Heating & electricity	!!!
Medical products	!!
Waste & waste water	!!
Pharmaceuticals	!!
Textiles & Laundry	!!
IT infrastructure	!
Housekeeping products	!
Patient transport	!
Paper use	!
Water use	!

!!!! = very high
!!! = high
!! = moderate
! = low
! = negligible

Fig. 1: Environmental relevance of different hospital areas. Provisional results calculated using the ecological scarcity method. Graphics: Karen Muir

Fig. 1: Prototype of the LaundReCycle on the Grüental campus, Photo: © Devi Bühler

LaundReCycle – Water after "Day Zero"

Devi Bühler
Research Associate, Ecotechnology Research Group, bued@zhaw.ch

"Day Zero" was the name given to the day on which the water ran out during the water crisis in 2018 in Cape Town, South Africa. Thanks to strict austerity measures, a state of absolute emergency was narrowly avoided. Since then it has become clear as never before: investments in new infrastructure and the development of new solutions are urgently needed. This is where the LaundReCycle project comes in. In cooperation with South African partners, the Ecotechnology Research Group is developing a washing machine operation which is self-sufficient in terms of water and energy. This does not need a connection to power, fresh water or a waste water disposal system. In the resource-saving cleaning process, the water is filtered after the wash cycle, skimmed off, biologically cleaned and can thus be reused directly for the next wash. Water losses are compensated for by rainwater. The solar panel provide the energy necessary to operate the washing machine and pumps. The prototype has recently been located at the ZHAW Grüental campus in Wädenswil. The project is part of the government-funded REPIC platform ➔ **repic.ch/repic-en/** and aims to develop the LaundReCycle innovation in South Africa into a marketable solution. ■