INTERREG Hybrid Parks, study on "responses to climate change"

Raingardens in Lower Austria, private gardens

Report November 2013

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Fotos: Regengärten in Kleinreichenbach

INTRODUCTION

Photo1 alliums, dandelions and grasses

This study examines the opportunities of the installation of different types of raingardens in private gardens in Lower Austria.

The main target group are the private garden owners. Therefore we consider it very important to address, beside the description of what raingardens are, also the explanation why we need a paradigm shift from getting rid of rainwater as save and quick as possible to a sustainable management and keeping rainwater as long as possible on site.

This as well as single persons should be able to recognize the possibilities of their contributions.

Credits to colleagues and other planners, accomplishers:

Doris Astleitner

Joachim Brooks

Markus Kumpfmüller

Karl Grimm

The main focus of this study is to develop understandable information and guidance help.

WHAT

Photo 2 ramsons in the raingarden

Raingardens are made up of native perennial plants with soil designed to absorb and manage stormwater run off. Their size and shape varies but there is always a positive impact on the environment beside the stormwater management. Raingardens function like planted infiltration or evaporation beds that can provide a variety of functions in our residential areas and private gardens:

• Adaptation and response to climate change,

• Aesthetically interesting installation with stones, gravel, natives and perennials to strengthen regional characteristics and identities, enhance recreational qualities and the understanding of natural processes by the garden owners,

• Planting of native wild perennials can increase biodiversity and resilience of our various garden landscapes,

• Raingarden as irrigation systems can be used for flower, vegetable and fruit plants.

Raingardens usually have no water. Depending on the design and intended function raingardens have 15 minutes up to 2 days water. In other times, these areas are dry.

WHY

Looking at the effects of anthropogenic climate change, we can observe that heavy rainfall and extreme drought and urban heat island effects increase even in rural residential areas. For developing holistic concepts for a sustainable rainwater management also small interventions in single gardens count as their duplications enhance multiple effects of using the ecosystem services of raingardens.
Sustainable rainwater management includes all actions to ensure precipitation - the goal is the fullest possible return to the natural water cycle, close to the site of occurrence. In addition to the sustainable use of rainwater itself, damages caused by overloading the sewage systems are prevented.

The modern rainwater management within a holistic catchment management concept has three strategies: infiltration, evapotranspiration, as well as storage and use. The first priority is the infiltration and evapotranspiration of water. If this is not (or only insufficiently) possible the rainwater should be stored and fed to various types of use later.
To achieve these objectives, there is a range of structural and technical measures. One of those are raingarden modules, which easily can be realised in private gardens. The underlying legal standards on the subject are widely scattered, the jurisdiction of the rainwater management system is a typical cross-cutting topic.

We can observe rain, as a component of the water cycle, very easily. The amount of rain that falls on a region determines, among other parameters, which soil and plant conditions developed according to these specific site situations. The bulk of the rain was absorbed by soil and plants, marsh and pond landscapes and was fed into ground water, stored and evaporated through plants and released back into the atmosphere. Only a small portion ran off to streams and rivers. In sealed dwelling areas, where often half up to two third of the places - roads and other infrastructure - cannot hold back any rainwater, the water cycle has deteriorated dramatically. The rain water flows freely across impervious surfaces, swells within a short time and overloads existing sewer and sewage treatment plants, and is lost for us after this brief event.

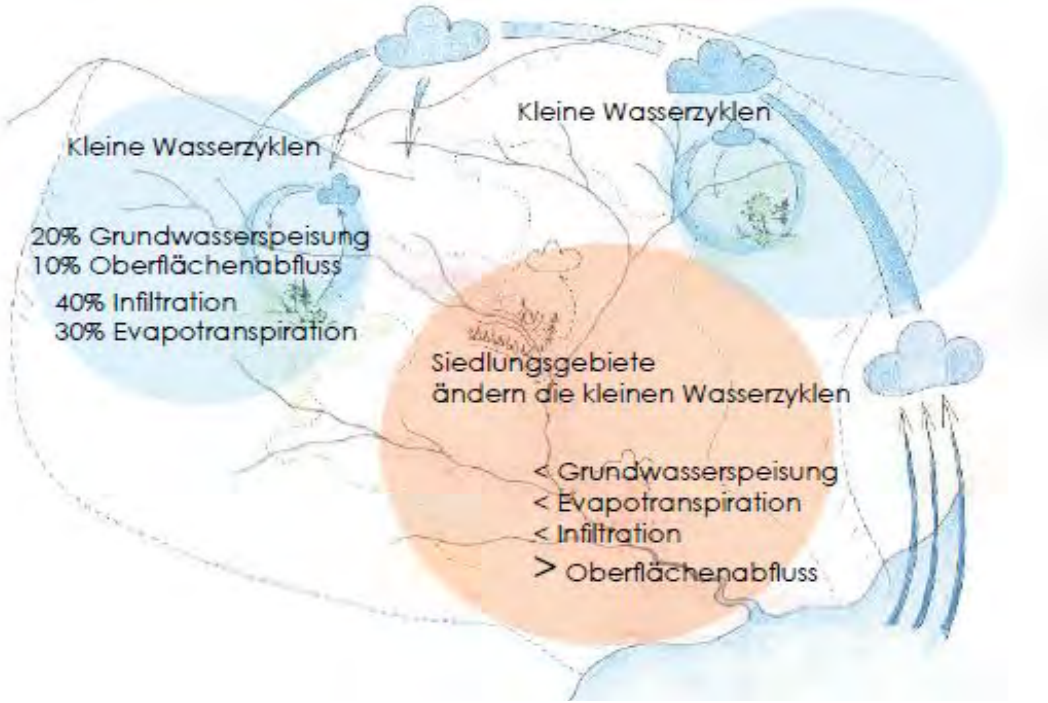

Fig 1 Water cycles, related to catchment areas

This drawing shows that within a catchment area many water cycles work together according to site specific micro climatic conditions. It shows the effects of dwelling areas, where the process of feeding back into the to ground water is strongly reduced, as well as the evapotranspiration and infiltration into the soil. Further it also shows opportunities in enhancing small water cycles to balance these dynamics.

The dimensions of the water (large and small water cycles) and energy cycle (sunlight) are in a dynamic equilibrium, which is determined by a variety of climatic, geological and biological factors - this affects the life and achievements of the respective ecosystems. The deterioration of the small water cycles causes increased incidence of heavy rainfalls, extreme drought and heat island effects. Of the components of the water balance, evaporation has a special importance as it connects the water cycle and energy cycle together. *"The evapotranspiration can be described as air-conditioning of the earth, for the earth's surface heat energy of the sun is absorbed, transported as water vapour into higher layers of the atmosphere, and there re-radiated in the condensation into space"* (Harlass, translated by Rottenbacher). Overheating of the earth is prevented and the living conditions to which the organisms have adapted are stabilized for longer periods. From the sealed surfaces of streets, squares and buildings, the evaporation is greatly affected in their annual balance, because the water is less buffered. The reduction of evaporation affects the energy cycle, as by the evaporation not required energy remains in the near-surface layers and leads to the increase of the sensible heat flux. In summer, the warming effect of sealing is particularly high, because already a lot of energy is radiated.

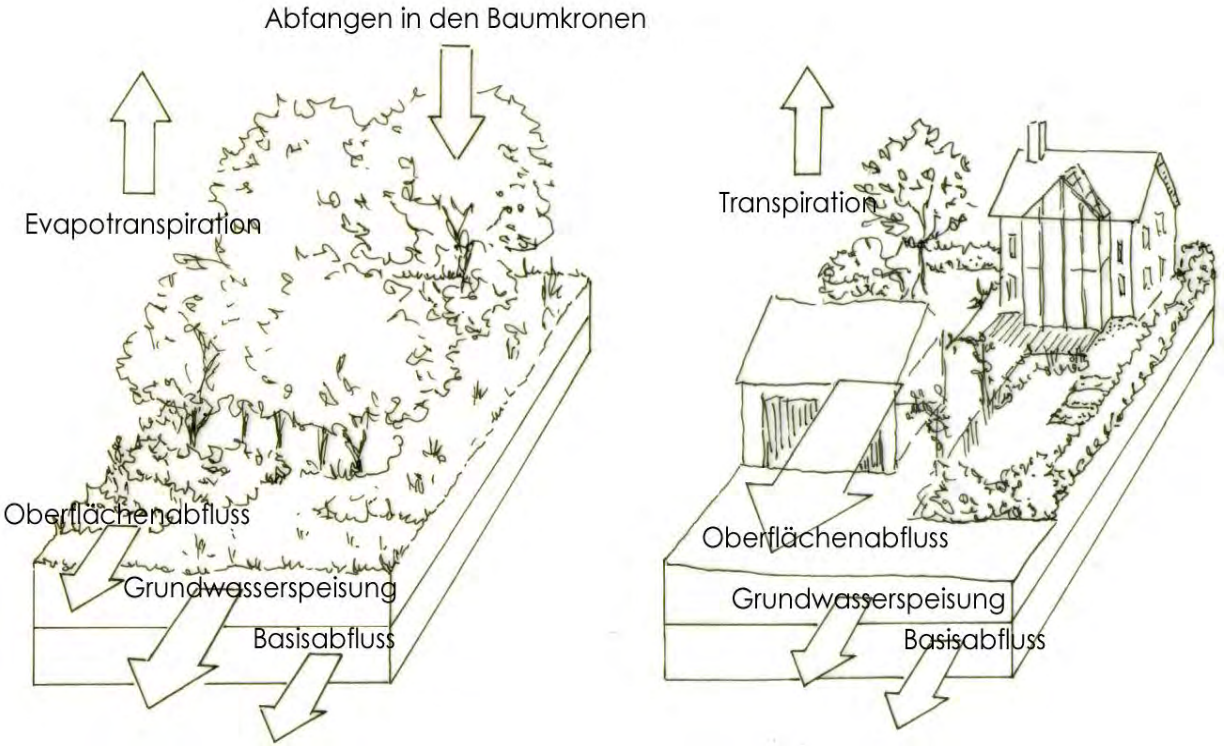

Fig 2 Graphics about small water cycle in a garden area before intervention - little surface runoff and high evapotranspiration; after intervention high runoff

This drawing shows how gardens are changed when their owners start building their houses, garages the accompanying terraces and pathways. Often 50% are sealed and the small water cycle is heavily impacted, as there is less interception by trees and much more surface runoff.

Raingardens here have the effect that the heavy rainfall peaks can be reduced, the retention of rainwater can be increased locally, and the water can be slowly discharged by evapotranspiration to the environment. We can observe cooling and longer lasting soil moisture in our gardens, as we initiate enhanced small water cycles back into our gardens. One raingarden can be regarded as one small step embedded in a holistic thinking concept. Several raingardens already contribute to implement natural measures in catchment areas.

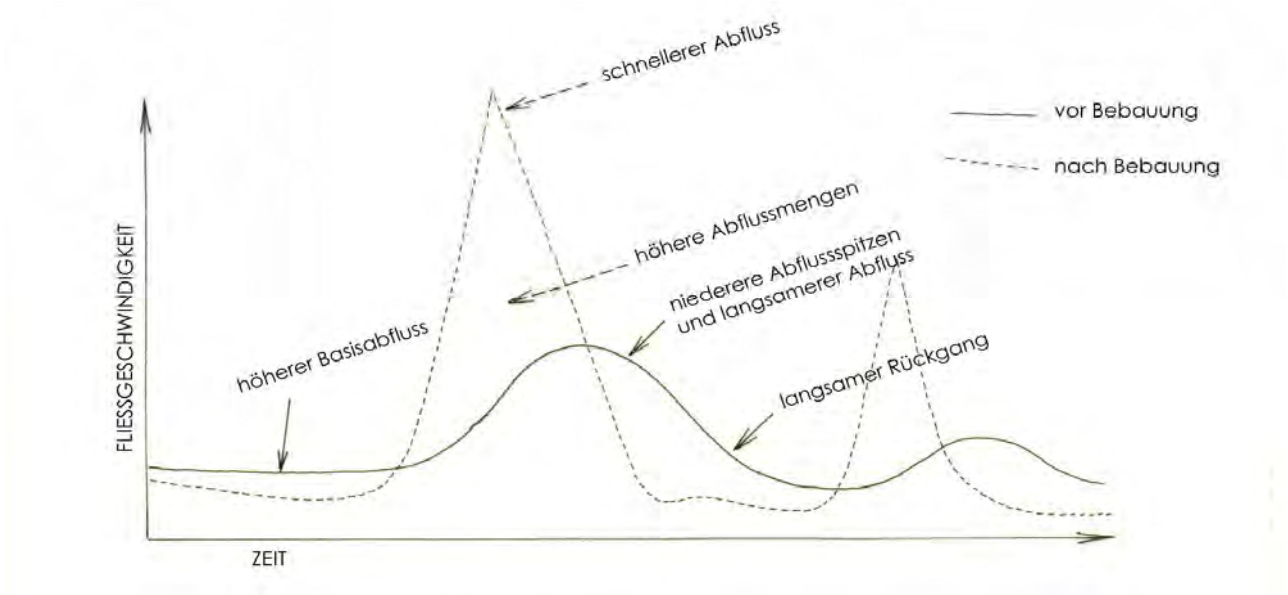

Fig 3 Schematic comparison peak discharge before / after development

Natural measures to retain water within the catchment consist of restoring or rehabilitating floodplains, wetlands, stream networks, reforestation of river basins headwaters, natural flood defence measures, increasing soil water retention, groundwater recharge and *sustainable dwelling drainage systems*. The objective is to create a more natural flow regime within a catchment.

Towards the end of 2010, the European Commission called for evidence on the costs and benefits of natural water retention measures and assessing their potential for increasing resilience to climate change. The potential impacts of climate change or other anthropogenic pressures drive the need for implementing natural water retention measures. The evidence received by the Commission is part of a broader initiative analysing the valuation of ecosystem services and green infrastructure strategies.

In combination with other stormwater management measures in dwelling areas we can use these ecosystem system services to our advantage and sustainable living, and increase the resilience to climate change - in this case using our knowledge of the interaction of the community soil - rainwater - plants. Rain gardens actively work to stop our greatest cause of water pollution in its tracks by managing stormwater runoff onsite. The combination of native plants and soil let raingardens absorb the run off while filtering out pollutants.

Photo 3 Al-Accumulation in the raingarden Kleinreichenbach

By doing so, rain gardens can ensure that the water runoff and the pollutants it catches don't overrun local water resources like streams, rivers and lakes. Increasing attention is paid to the use of plants to remediate contaminated rainwater. New research is being conducted to determine how effective plants are at removing contamination from polluted waters due to both stormwater and wastewater discharges (Wang et al 2002). Phytoremediation is an emerging technology that uses plants to degrade, extract, contain, or immobilise contaminants such as metals, pesticides, explosives, oil, excess nutrients, and pathogens from soil and water. Phytoremediation has been identified as a more cost effective, non-invasive, natural, and publicly acceptable method of removing environmental contaminants than most chemical and physical methods (Arthur et al. 2005).

Photo 4 raingarden Kleinreichenbach

The majority of plants currently used in phytoremediation applications, including stormwater ponds, riparian buffers, raingardens, green roofs, constructed wetlands, etc., are herbaceous or non-woody.
New stormwater runoff systems that incorporate woody landscape plants into the
systems are being designed for streetscapes and landscapes.

Photo 5 raingarden with trees, Büro Grimm

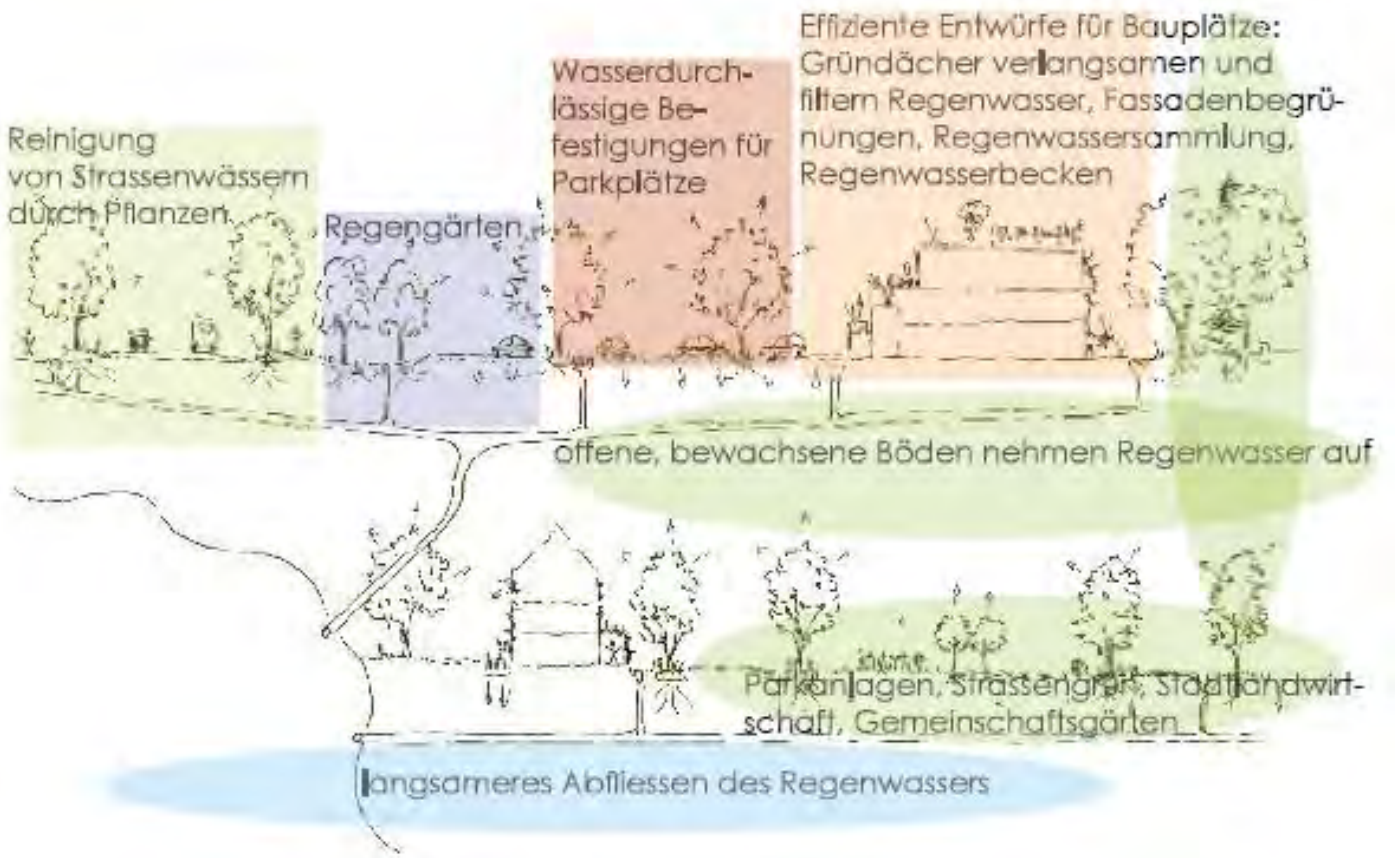

Fig 4 Combination of measures in dwelling areas

This drawing shows the combination of different measures of a sustainable rain water management in dwelling areas. You can combine the treatment of street water runoff with plants that accumulate contaminants, raingardens keep rainwater on site, to use pervious pavings enhances the infiltration into the ground, green roofs, green walls can keep up to 70% of rainwater, how you organise the use of public places (eg. store water for parks and community gardens balances the water and energy cycle.

HOW in our private gardens

1 Understand the site and its surrounding context, such as climatic conditions, wind direction, soil, plants, typical location, topography and sun-shadow patterns

2 Determine the size and location of the rain garden

3 Design a place-based shaping

4 Plug the place, secure the topsoil, earth, and deliver additional substrate when necessary

5 Planting

6 Observe, Monitor and Maintain

Photo 6 unknown source

ad 1 Understand the site and its surrounding context, such as climatic conditions, wind direction, soil, plants, typical location, topography and sun-shadow patterns

Lower Austria has various landscapes. Therefore it is useful to look at these first with the focus on which plant communities are typical, which soil conditions may be encountered, main wind frequencies and rainfall patterns and what are the special features of the several landscape regions.

For a rain garden you can find a wide range of native wild plants that can react very robust to the different habitat requirements of the raingarden. Essentially, the range of plants from dry sites with more permeable soils, up to wet-dry and rich moist locations can be used. Important in the selection of plants is increasingly to avoid invasive neophytes.

Before you start investigating try to answer following questions:

- Is it possible to infiltrate water on my site? In some rare cases you cannot infiltrate water in the soil-water body because of geological reasons (mobile silt) or because of an upcoming high groundwater- you can ask your council about these conditions.
- What plants grow on my property or in its environment at the moment? Collect seeds of wild plants to experience with similar site conditions.
- Which soil condition can I find on my site? Analyse the soil where it would be possible to place the raingarden:

Soils vary in fertility, drainage and pH rating. As the rainwater needs to soak into the soil of your raingarden, sandy and loamy soils drain well. Clay soils may become waterlogged.
You can test your soil by taking a handful of moist soil from your garden and give it a firm squeeze. If the soil holds its shape, give it a slight poke - if the soil crumbles slowly into parts you can use the soil without any change. If the soil holds its shape your soil contains too much clay. If the soil falls apart immediately when you open your hand, then your soil is too sandy and needs more structure. Soil can be improved with compost. When there is too much clay you can use a mix that is 50-60% sand, 20-30% topsoil and 20-30% compost.

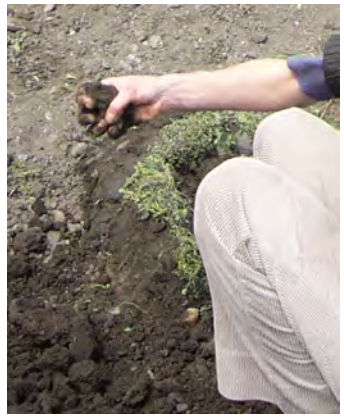

Photo 7 squeeze the soil

You can test your drainage with digging holes in the prospective areas for your raingarden. The holes should be about 20 cm wide and 20 cm deep. Then you pour in buckets of water. The water should drain at a rate of about 3 cm every hour. If it takes longer than that, improve your soil. The water permeability of soil is usually defined by the grain size, grain size distribution and the bulk density.

Photo 8 digging holes

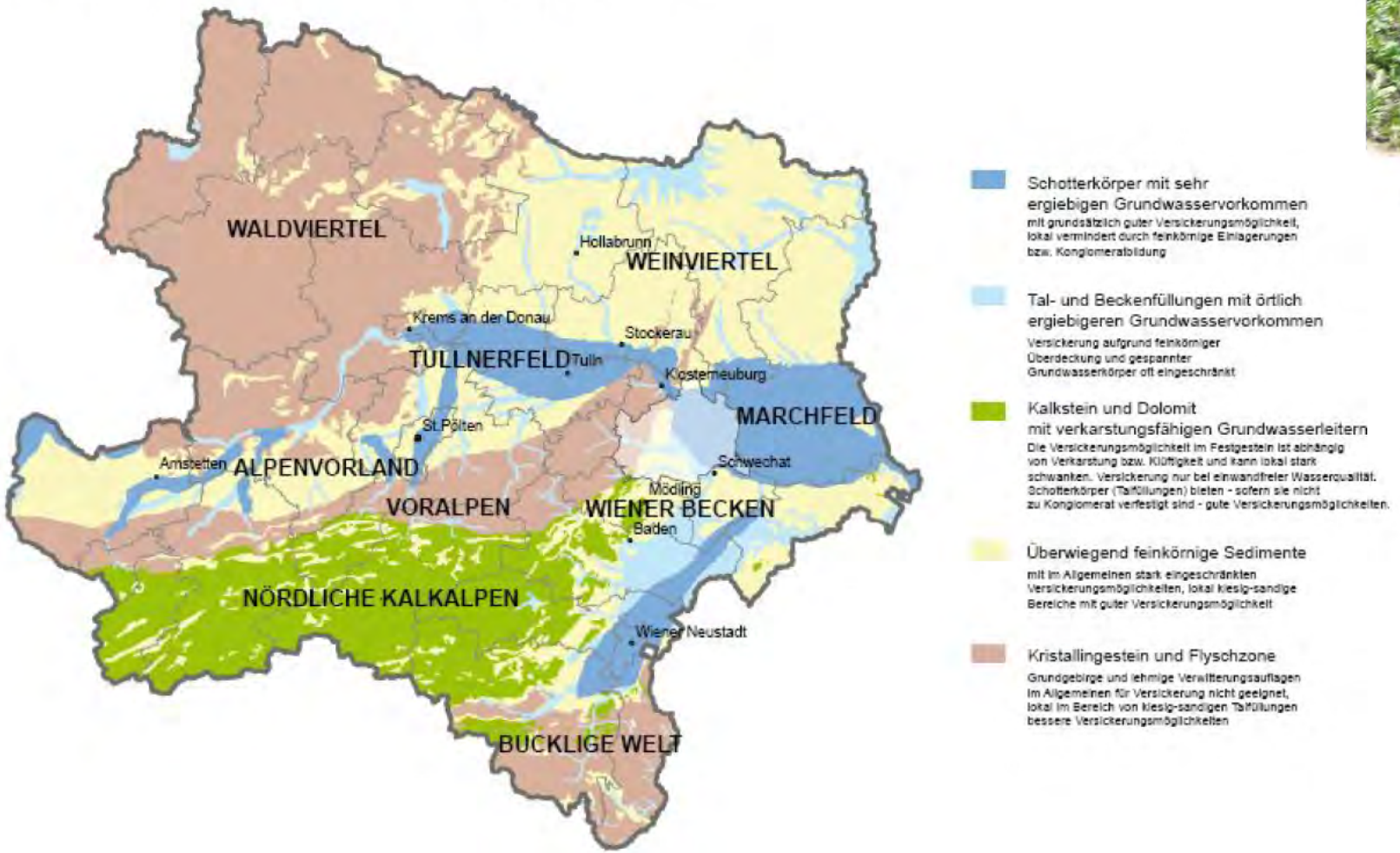

Fig 5 Areas of different infiltration opportunities

- which rainfall patterns do I encounter in average in my region?

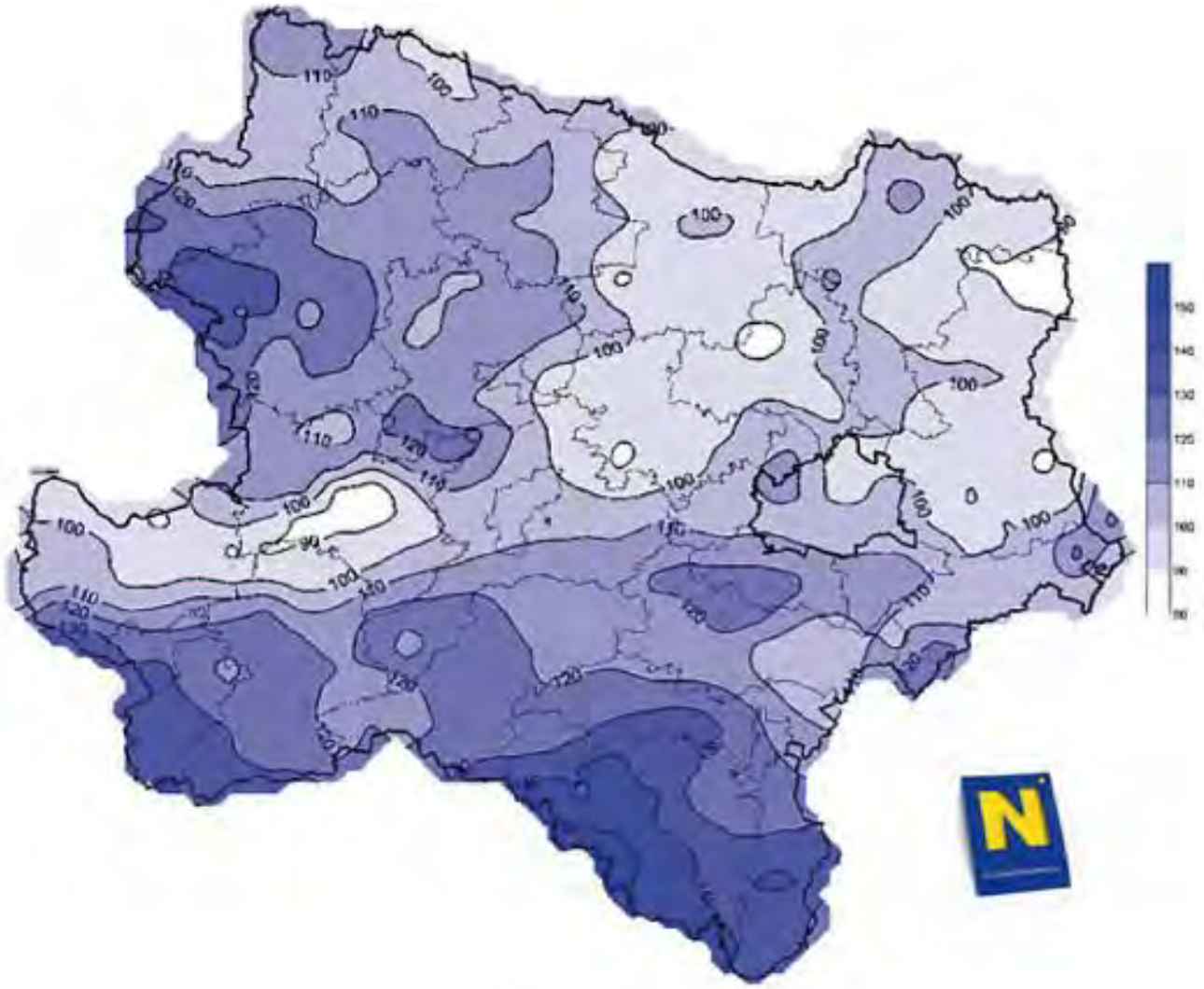

Fig 6 Areas of rainfall patterns (ml/m^2/15 min once a year)

At your council you can receive information about average and special rainfall patterns of your place. Often neighbours have their own helpful observations.

- identify micro climatic conditions as south-facing, north layers, cold air lakes, sun shade pattern and topography on the property to survey the special site conditions for positioning of the raingarden and the determination of plant selection.

Before you go on:

1. Decide on where you want your rain garden to go.

The garden should be in a spot where water runs towards and collects naturally.
It should be down slope at least 3 meters away from your building's foundation

2. Be aware of underground lines or utilities.

Photo 9-13 identify conditions and decide where you want the raingarden to go

ad 2 Size and Position

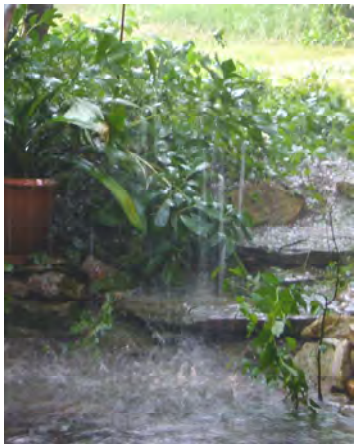

Photo 14 heavy rainfall

Every rain garden is site specific. Individual elements of a comprehensive stormwater management of a garden can be green roofs, leaving unsealed soils, using porous sealing, especially at entrances, to collect rainwater, and raingardens. Therefore size and position depend on:

- Which water I want to collect: roof water, sealed surfaces, driveways;
- How I want to use it: grey water, to evaporate, to support irrigation.

Even a small rain garden will make a difference in managing the site's rainwater runoff.

The ideal goal would be a garden that will absorb all the rain. How to calculate the most useful size of a smaller garden:

- Figure out what kind of soil you have – clay, sand, etc.
- Find out what hard surfaces (roofs, sidewalks, patios, driveways) will produce the rainwater runoff for your raingarden. Different parts of your roof drain to different downspouts - consider only the areas that will drain into your raingarden.
- Multiply the width of your roof by the length of your roof and paved areas to get the square meters. In sandy soil the raingarden should be20 to 30% of the drain area and in clay soils the raingarden should be about 60% of the drain area as clay absorbs water poorly.

Art der Oberfläche	Abflussbeiwert
Hart gedeckte Dächer[1]	1,0
Begrünte Dächer[1]	0,4 bis 0,7
Befestigte (z. B. asphaltierte) Höfe und Wege[1]	0,8 bis 1,0
Kieswege (verdichtet)[1]	0,6 bis 0,8
Rasengittersteine[2]	0,3 bis 0,5
Schotterrasen[2]	0,2 bis 0,3
Rasen[2]	0,1 bis 0,5

Fig 7 Runoff parameters

Rain Gardens should be at minimum 20% of the size of the roof, patio or pavement draining into it. Following values of the Austrian ÖNORM 2506-1 can help identifying runoff parameters for calculating the runoff of different surfaces.

Position

Raingardens work well there, where the rainwater is directed away from the houses, at least positioned 3 meters away from buildings and 1 meter distant from a driveway or patio. You have to ensure where tree roots lye, water supply, wells and underground utilities.

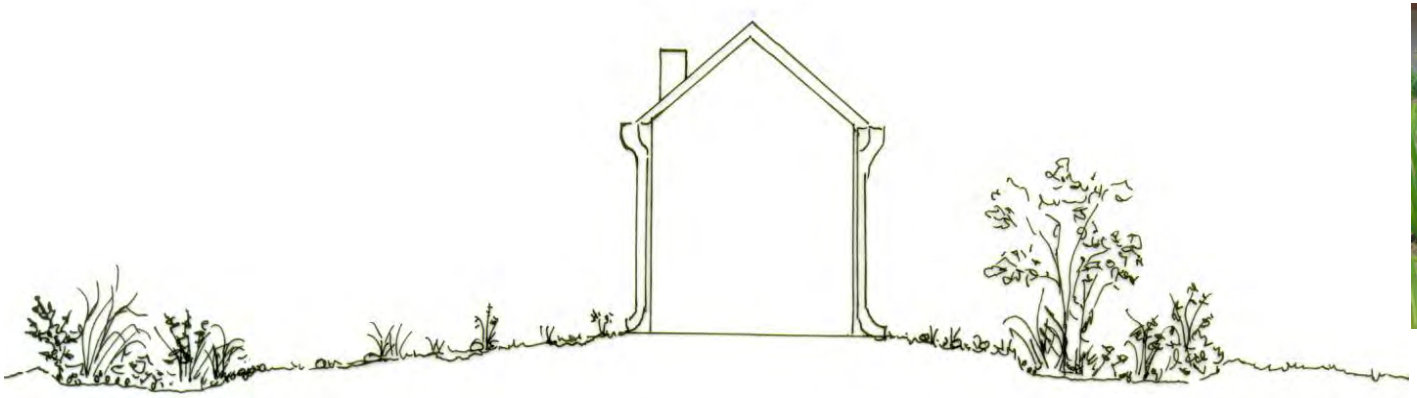

Photo 15 raingarden outlet

Fig 8 Possible arrangement of raingardens (from the house)

The simplest raingarden would be a swale, built of the existing topsoil, with the size between 20 and 60% of the sealed surfaces. The depths of the swale (or the other forms of plated raingardens) is calculated with 0.95 x sealed area + 0.15 x lawn area + size

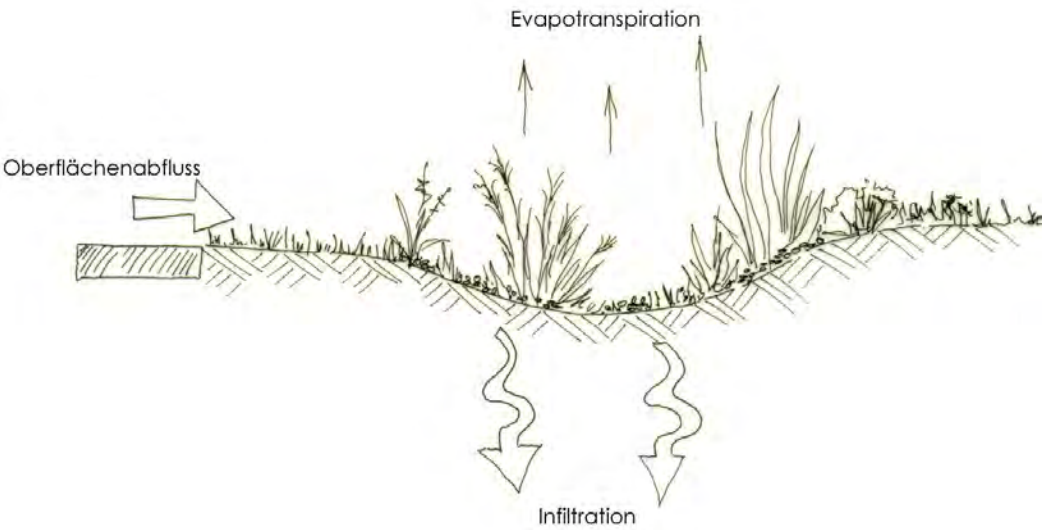

Photo 16 planted swale by Markus Kumpfmüller

Fig 9 Humblest possibility of a rain garden (with existing topsoil)- planted swale

3 Design a space-based shaping

Depending on the selected site you can start with a design of your raingarden. The purpose of your raingarden is to soak up rainwater and prevent runoff. Create a flat area or a depression where rainwater will collect as it sinks into your soil. The standard depth for your rain garden's "ponding" area is about 15 cm. It is more convenient to work with the site, by terrain modelling with infiltration and landscaping.

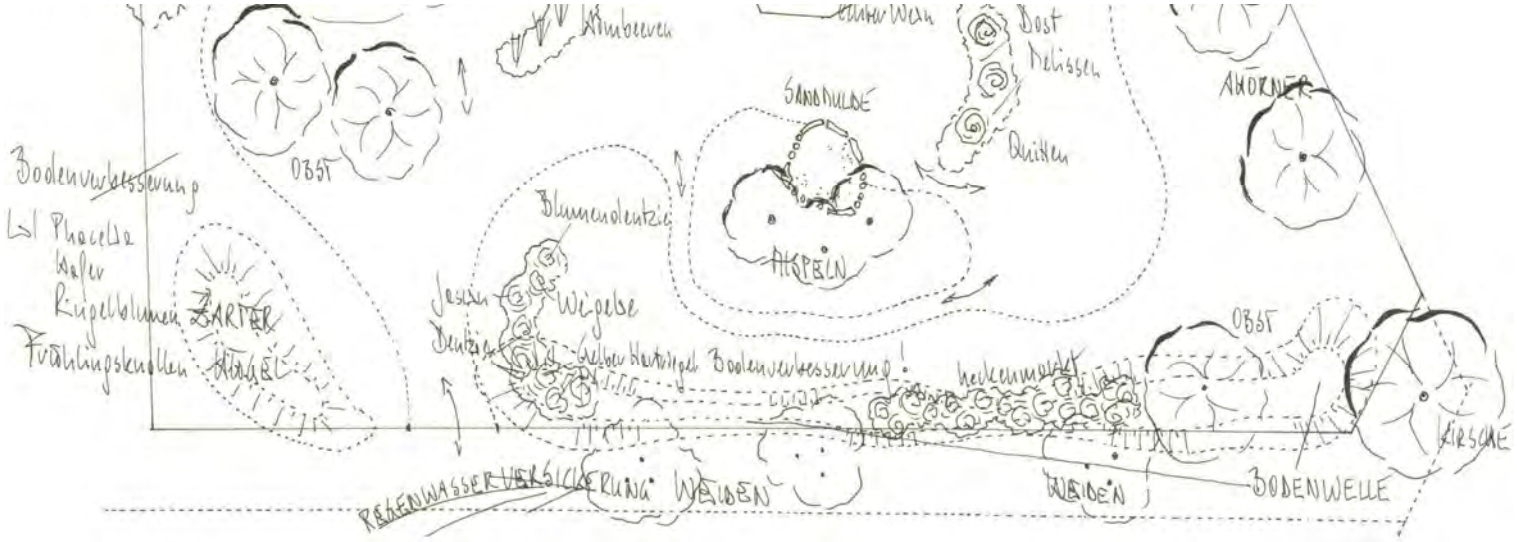

Fig 10 Modelling of embankments and swales to create attractive garden landscapes

Photo 16-18 planted "ponding" areas

Keep in mind an S- shaping modelling that the new part fits well into the surrounding.

The bottom of your rain garden's depression should be saucer-shaped rather than bowl-shaped.

That way, the rainwater will always spread out as much as possible. Adjust the depth of the depression to the infiltration rate. For soils with slow drainage, make your pond shallower to reduce the amount of water. If your soil sucks up water, make the depression deeper to increase its storage capacity. Rain gardens have very wet, wet to dry, and dry zones. Different types of plants will thrive in different zones.

Example: At entrances where street water has access, following possibility can create an attractive raingarden:

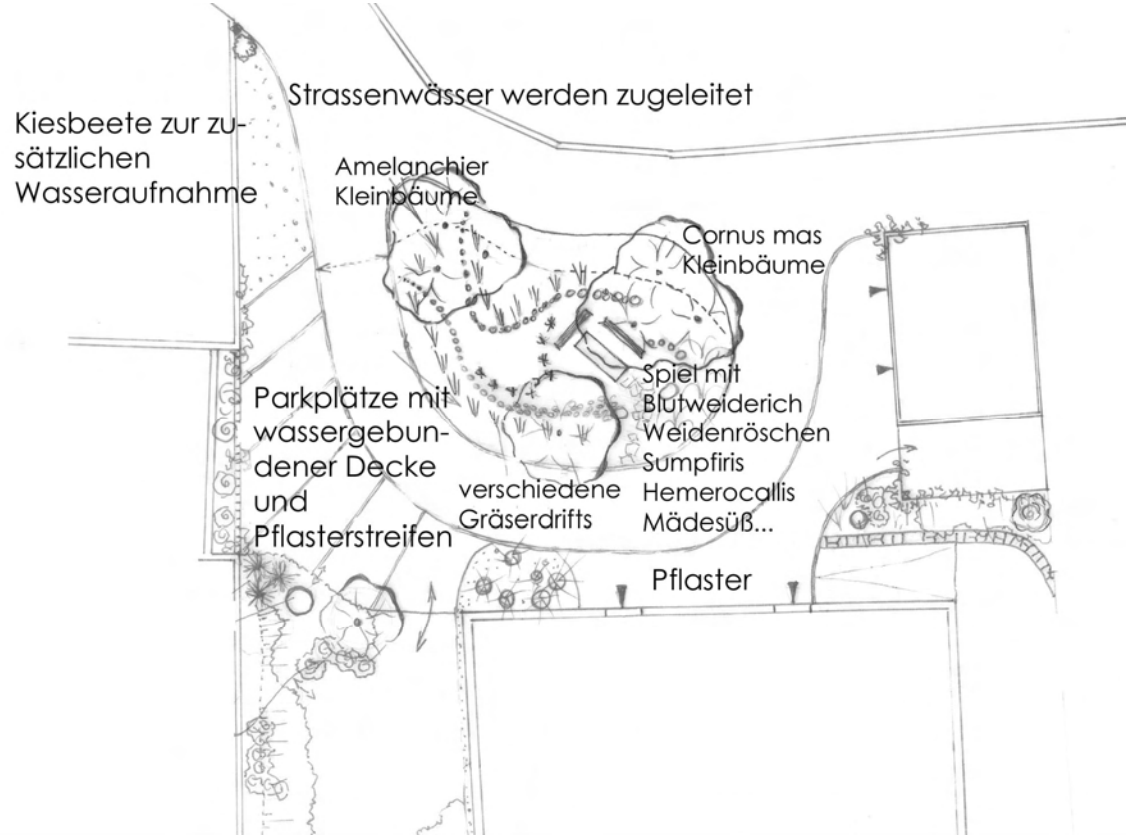

Fig 11 Raingarden at an entrance zone

Photo 19 modelling, Büro Grimm

Photo 20 raingarden, Portland report

Photo 21 raingarden at an entrance zone

Example: Here the comprehensive stormwater management combines rainwater harvesting from the roofs with rainwater evapotranspiration from pervious areas and connecting the final raingarden with a creek and marsh area.

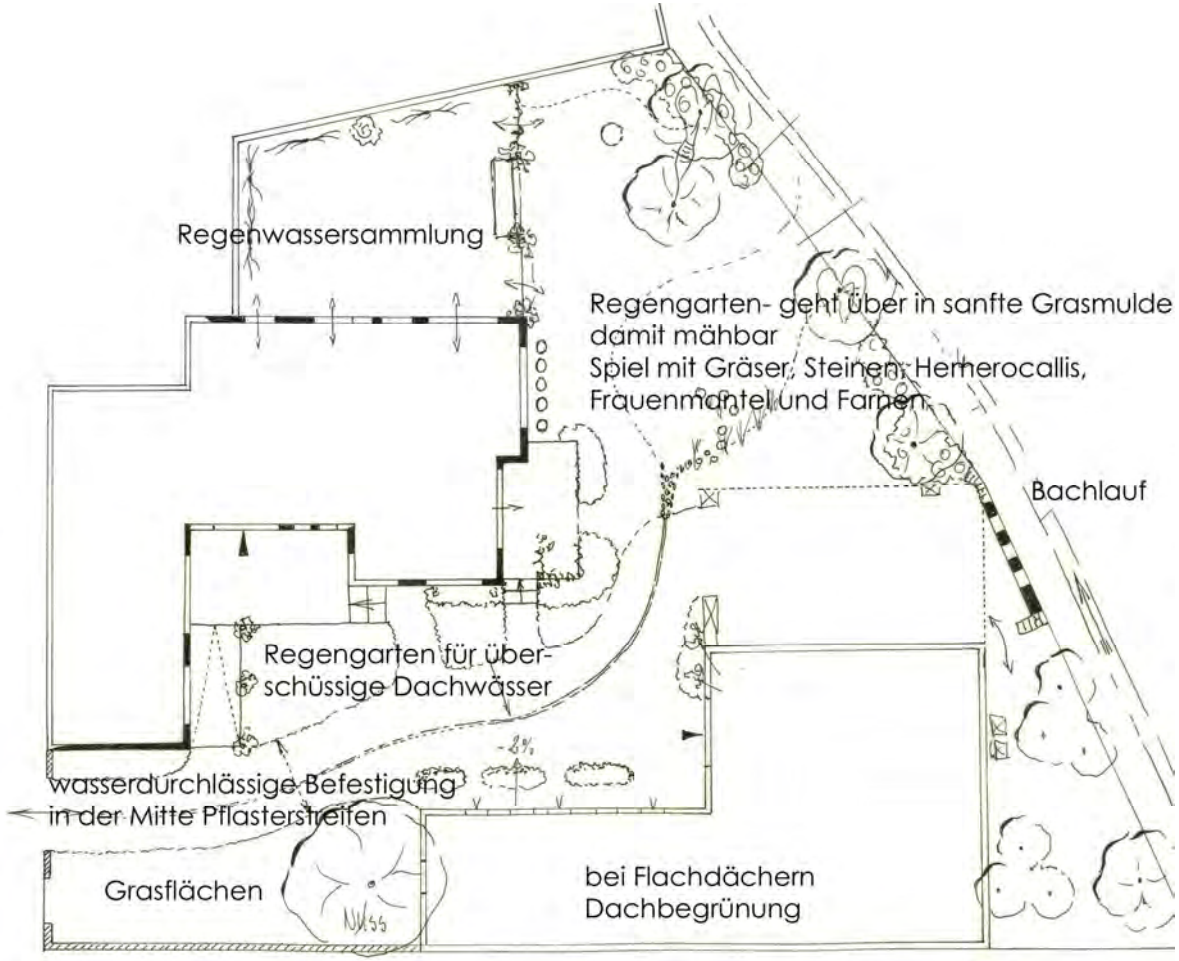

Fig 12 Example positioning of raingarden combined with a comprehensive stormwater management in the garden

Photo 22 raingarden

Photo 23 ferns and lady's mantle

Example: Often existing sites can implement retrofitting arrangements:

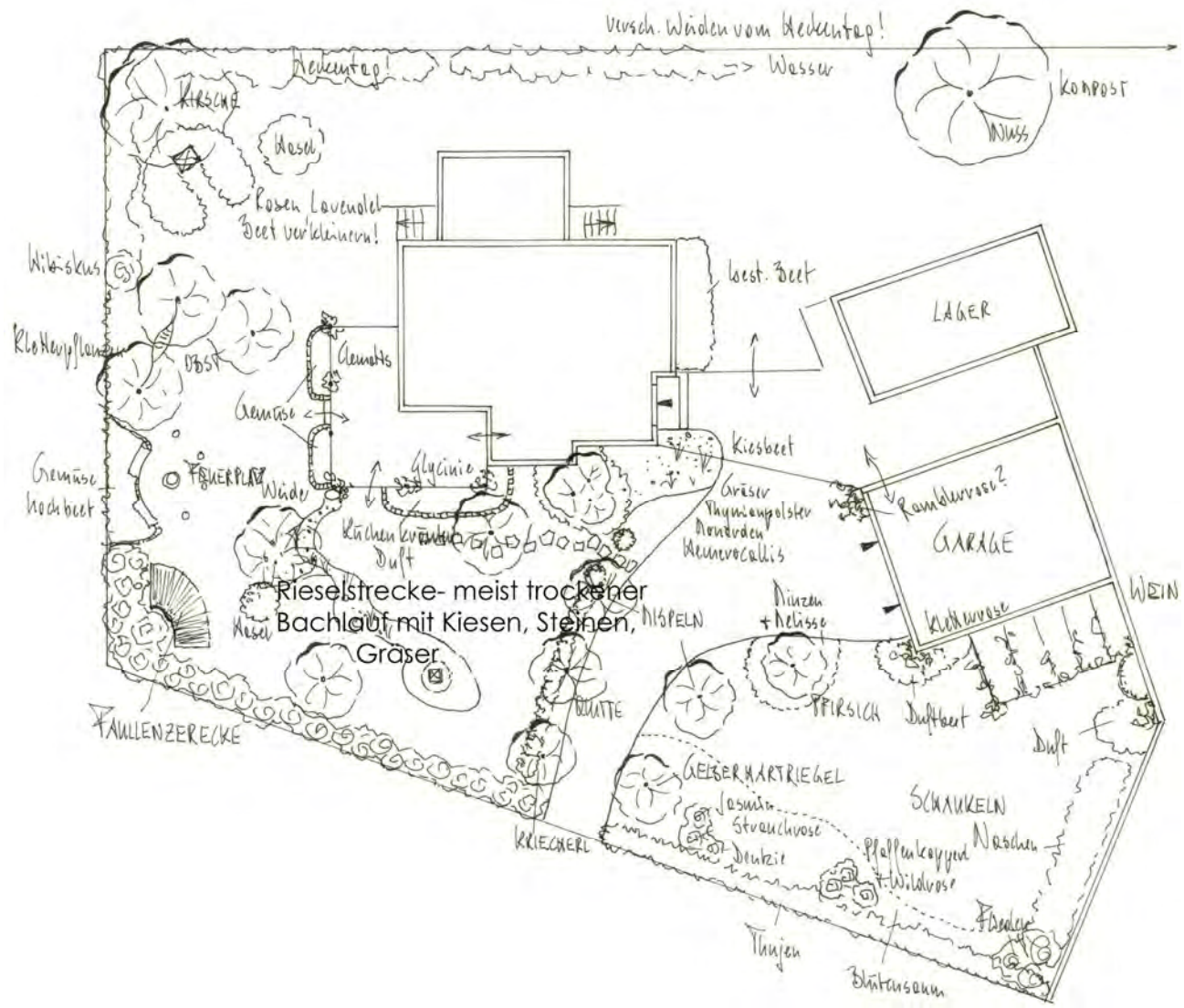

Fig 13 Subsequent implementing of infiltration "creeks"

Photo 24 infiltration "creek"

Photo 25 succession at the "creek"

Basically, a raingarden can absorb rainwater from roof water and paved areas or from the snow melt. It is advantageous to collect roof rainwater first and then slowly forward it to the rain garden to prevent erosion. When the paved areas are relatively large, it is advisable to provide a lawn swale before the water is then taken into the rain garden so that sediments can be collected separately.

Example: Very interesting rain garden basins along steeping plant beds, these can specifically be used for irrigation of vegetables and fruit(here apricots- also works with cherries and plums).

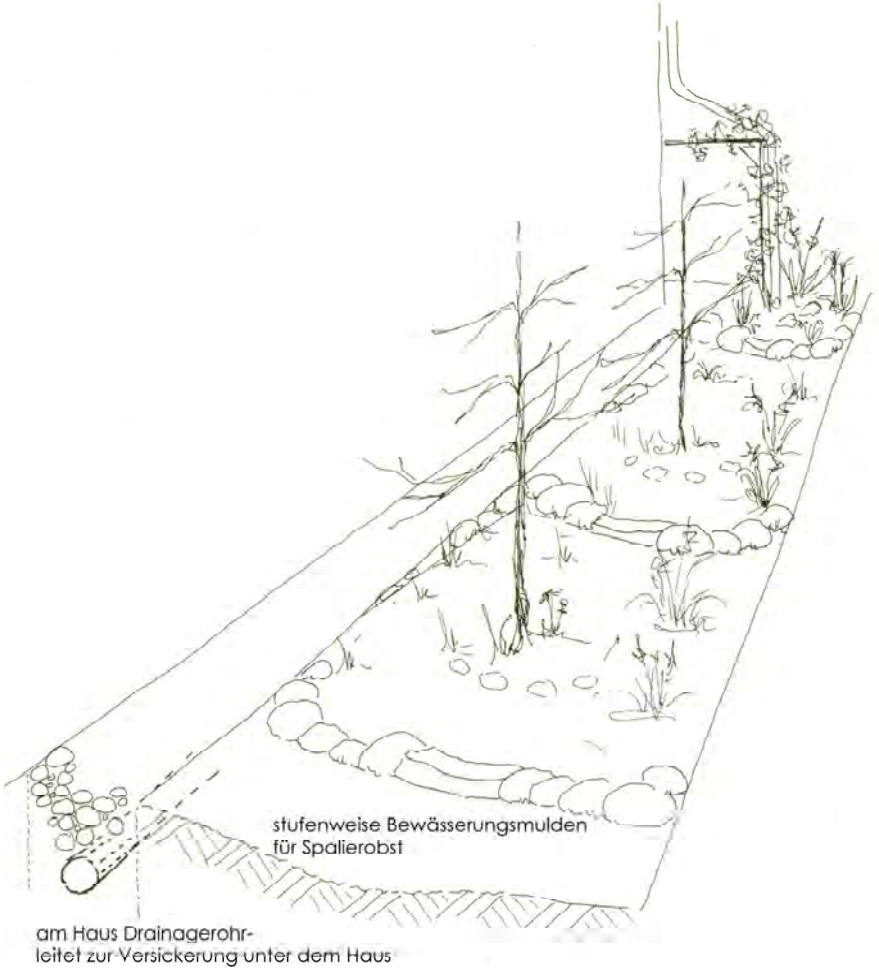

Fig 14 Irrigation swales

Photo 26-28 fruit trees and strawberries in the irrigation swales

4 Plug the place, secure the topsoil, earth, and deliver additional substrate

For starting to build first draw the plan 1:1 to the ground.

Then remove the upper grass turfs and put it upside down onto your compost.

Then remove the topsoil and place it on a defined place to use it later.

According to the conditions on site remove, exchange or leave the soil.

If you already have a well drained soil you only have to dig the storage area,

calculating as well the topsoil layer and mulch.

When you have to exchange/ add some components you have to calculate this amount.

Photo 29 remove grass turfs

Photo 30 building

5 Planting

Why Native Plants?

Native plants, planted in the appropriate soil conditions, have developed genetic knowledge to the specific region for centuries with which they can better survive inhospitable conditions, such as floods, droughts and other extreme with low maintenance interventions. Native plants provide a habitat for our wildlife insect world, they form deep root systems that can support the infiltration, and they can create aesthetically interesting spaces.

Photo 31 planting

Mixture of wild shrubs, wild shrubs, perennials and grasses, for alternating wet locations (usually for half a day wet after a rain event, otherwise rather dry, depending on the soil structure).

Native plants attract butterflies and birds. When you put native plants in your garden, you make a new habitat for local wildlife.

Many native plants have deep roots - some roots go down 8 meter! These roots form deep channels that absorb rainwater. Some of the roots die each year, and new roots grow. Decomposing roots make the soil more fertile and absorbent. The root systems hold soil together and help prevent erosion.
At photo 32 you can see:

Allium ursinum
Anemone nemorosa
Anemone sylvestris
Aruncus dioicus
Asarum europaeum
Aster divaricatus
Dryopteris filix-mas
Galium odoratum
Phegopteris connectilis

Polygonatum odoratum
Pulmonaria officinalis
Valeriana officinalis

You can grow plants from seed or order them from native plant nurseries.
Choose your plants and design to fit the conditions of your site.

Photo 32 natives can be very attractive

Photo 33 allium and dandelion

Recommendations for different site/soil conditions:

sunny dry soils (brief wet periods):	especially half shade:	moist sites:
Achnatherum calamagrostis	Aconitum napellus	Allium suaveolens
Alcea rosea	Alliaria petiolata	Cirsium rivulare
Alcea rosea „nigra“	Allium ursinum	Dianthus superbussuperbus
Antirrhinum majus	Anemone nemorosa	Eupatorium cannabium
Artemisia Varieties	Anemone ranunculoides	Filipendula ulmaria ulmaria
Aster amellus	Anemone sylvestris	Iris sibirica
Aster novi-belgii	Aquilegia nigricans	Lysimachia vulgaris
Briza media	Aquilegia vulgaris	Lythrum salicaria
Bromus Varieties	Aruncus dioicus	Mentha aquatica
Calamintha nepetoides	Asarum europaeum	Myosotis palustris
Campanula persicifolia	Aster divaricatus	Pseudolysimachion longifolium
Campanula latifolia	Astrantia major	Stachys palustris
Delphinum Hybr. „Abgesang“	Campanula persicifolia	Trollius europaeus
Delphinum Hybr. „Völkerfrieden“	Cyclamen purpurascens	Valeriana dioica
Dentaria bulbifera	Digitalis grandiflora	
Dianthus carthusianorum	Dryopteris filix-mas	
Dictamnus albus	Galium odoratum	
Digitalis grandiflora	Helleborus foetidus	
Digitalis lutea	Hepatica nobilis	
Echinops ritro	Fragaria vesca	
Echium russicum	Helleborus foetidus	

Festuca species „Hoggar“	Lamium montanum	
Filipendula vulgaris	Lilium martagon	
Gentiana cruciata	Phegopteris connectilis	
Geranium pratense	Polygonatum odoratum	
Geranium sanguineum	Primula veris	
Gypsophila paniculata	Pulmonaria officinalis	
Helianthus annuus	Viola odorata	
Inula Varieties		
Iris barbata Varieties		
Iris germanica x„After Dark“		
Iris germanica x„Dusky Dancer“		
Iris pallida		
Iris spuria		
Knautia		
Koeleria glauca		
Lathyrus vernus		
Lilium martagon		
Lupinus polyphyllus		
Lysimachia punctata		
Muscari neglectum		
Origanum vulgare		
Origanum vulgare „compactum”		
Polemonium coeruleum		
Polygonatum multiflorum		

Pulmonaria officinalis		
Pulsatilla		
Ruta		
Salvia pratensis		
Saponaria officinalis		
Scilla bifolia		
Stipa Grasses		
Verbena officinalis		
Veronica teucrim		
Verbascum nigrum		
Verbascum olympicum		
Vinca minor		
Vincetoxicum hirundinaria		
Viola odorata		

6 Observe, Monitor and Maintain

As experienced gardeners you will already know that each site is different and special. Therefore "playing with" and maintaining raingardens as well will be always different according to the conditions on site. Be free to watch, manage successions, change and adapt plantings, create installations and experience nature.

List of Fotos and Figures:

All Photos without naming are by Christine Rottenbacher

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Normen und Regelblätter

Folgende Normen und Regelblätter sind für die Auslegung, Berechnung und Ausführung zu beachten: (in den geltenden Fassungen)

ÖNORM B 2506-1: Regenwassersickeranlagen für Abläufe von Dachflächen und befestigten Flächen – Anwendung, hydraulische Bemessung, Bau und Betrieb

ÖNORM B 2506-2: Regenwassersickeranlagen für Abläufe von Dachflächen und befestigten Flächen – Qualitative Anforderung an das zu versickernde Regenwasser, Bemessung, Bau und Betrieb von Reinigungsanlagen

ATV A-138: Entwurf, Planung, Bau und Betrieb für Anlagen zur Versickerung von Niederschlagswässern

ÖWAV-Regelblatt 35: Behandlung von Niederschlagswässern

In the field of stormwater management are relevant:

Regulations, the General Wastewater Emission Ordinance (AAEV) 6,

Wastewater emission control regulation, Regulation 7,

VO according to the extension of the deadlines. § 33g WRG 19599 .

Rechtliche Situation in NÖ

Bauordnung und Bautechnikverordnung

In diesem Zusammenhang sind mehrere Regelungen zu beachten, die folgende Themen betreffen:

• Einer Baubewilligung bedarf die Veränderung der Höhenlage des Geländes auf einem Grundstück im Bauland, wenn dadurch der Abfluss von Niederschlagswässern zum Nachteil der angrenzenden Grundstücke beeinflusst werden könnte (§ 14 Abs. 8) und § 67 NÖ Bauordnung 1996).

• § 62 NÖ Bauordnung 1996 sieht eineAnschlussverpflichtung an die öffentliche Kanalisation lediglich für Schmutzwässer vor, nicht jedoch für Niederschlagswässer. Damit kann dem wasserwirtschaftlichen Ziel nachgekommen werden, anfallendes Oberflächenwasser unmittelbar am Ort des Anfalles wieder dem natürlichen Wasserkreislauf zuzuführen. Allerdings darf die Versickerung oder oberflächliche Ableitung von Niederschlagswässern weder die Tragfähigkeit des Untergrundes noch die Trockenheit von Bauwerken gefährden.

• Die NÖ Bautechnikverordnung 1997 behandelt in den §§ 19 und 64 die Ableitung der Dachwässer: Dachrinnen, Fallrohre oder sonstige Einrichtungen zur technisch einwandfreien Sammlung und Ableitung von Niederschlagswässern sind dann erforderlich, wenn diese von einem Dach auf Verkehrsflächen oder Nachbargrundstücke gelangen können oder eine gesammelte Ableitung zur Vermeidung von Beeinträchtigungen (z. B. Durchfeuchtungen) erforderlich ist.

• Anlagen zur Ableitung der Abwässer sind lt. § 19 (1) in Bauplänen darzustellen.

Wasserrechtsgesetz

Eine wasserrechtliche Bewilligungspflicht für Anlagen der naturnahen Oberflächenentwässerung besteht nur dann, wenn die geplante direkte Einleitung zu einer nennenswerten hydraulischen Belastung des Vorfluters führen kann oder durch die Einleitung/Versickerung eine mehr als geringfügige Einwirkung auf das Gewässer zu erwarten ist. Besonderes Augenmerk ist dabei auf folgende Regelungen des Wasserrechtsgesetzes 1959 zu richten:

• § 32 „Bewilligungspflichtige Maßnahmen“:

Eine Bewilligungspflicht bei Einwirkungen auf das Gewässer ist immer dann gegeben, wenn nach dem natürlichen Lauf der Dinge mit nachteiligen Einwirkungen auf die Beschaffenheit der Gewässer (auch Grundwasser) zu rechnen ist. Diese ist insbesondere dann gegeben, wenn die Gefahr eines Eindringens von wassergefährdenden Stoffen zu erwarten ist. Eine generelle wasserrechtliche Bewilligungspflicht für Anlagen der naturnahen Oberflächenentwässerung besteht demzufolge zwar nicht, es wird aber dringend empfohlen, mit der zuständigen Behörde (Bezirkshauptmannschaft oder Magistrat) abzuklären, ob für ein geplantes Projekt eine wasserrechtliche Bewilligung erforderlich ist – außer wenn eine Anlage oder Maßnahme derart gestaltet ist, dass eine Einwirkung auf Gewässer von vornherein und mit Sicherheit ausgeschlossen werden kann.

• § 12 „Grundsätze für Bewilligung bezüglich öffentlicher Interessen und fremder Rechte“:

Die Maßnahme darf keine Beeinträchtigung der öffentlichen Interessen bzw. fremder Rechte darstellen.

• § 12a „Stand der Technik“:

Geregelt wird der Stand der Technik in der Allgemeinen Abwasseremissionsverordnung § 3 bzw. sind diverse Regelwerke und Normen heranzuziehen (ATV 138, ÖNORM B 2506), insbesondere auch hinsichtlich Qualität und Bemessungsgrundlagen.

• § 30 „Von der nachhaltigen Bewirtschaftung insbesondere vom Schutz und der Reinhaltung der Gewässer“:

Regelt, nach welchen Kriterien des öffentlichen Interesses Gewässer – auch das Grundwasser – zu schützen sind.

- Keine Gefährdung der Gesundheit von Mensch und Tier
- keine Verschlechterung der aquatischen Ökosysteme

- nachhaltige Wassernutzung, d. h. ein langfristiger Schutz der vorhandenen Ressource muss gewährleistet werden

- das Grundwasser ist so zu schützen, dass es als Trinkwasser verwendet werden kann und eine schrittweise Reduzierung der Verschmutzung und eine Verhinderung der weiteren Verschmutzung sichergestellt werden.

• § 33 „Reinhaltungspflicht“: Wer zur Einwirkung auf die Beschaffenheit von Gewässern berechtigt ist, hat sämtliche Maßnahmen zur Vermeidung von Schäden zu ergreifen.

• § 39 „Änderung der Abflussverhältnisse“:

Der natürliche Abfluss darf nicht zum Nachteil benachbarter Grundstücke (Unterlieger) verändert werden. Dies gilt auch für land- und forstwirtschaftliche Flächen. Im Bauland gelten die zusätzlichen Regelungen der Bauordnung.

Es besteht keine allgemeine Verpflichtung zur Einleitung von Regenwasser in den Kanal. Maßnahmen des Regenwassermanagements **ohne bauliche Anlagen sind anzeigepflichtig, solche mit baulichen Anlagen bewilligungspflichtig.**

NÖ Bauordnung:

§ 15 Anzeigepflichtige Vorhaben

(1) Folgende Vorhaben sind mindestens 8 Wochen vor dem Beginn ihrer Ausführung der Baubehörde schriftlich anzuzeigen:

- die Ableitung oder Versickerung von Niederschlagswässern ohne bauliche Anlagen in Ortsgebieten;

Das NÖ Kanalgesetz fördert Regenwassermanagement insofern**, als bei Einleitung** von Regenwasser ein um 10% höherer Einheitssatz berechnet wird.

NÖ Kanalgesetz:

§ 5 Kanalbenützungsgebühr

(2) Die Kanalbenützungsgebühr errechnet sich aus dem Produkt der Berechnungsfläche und dem Einheitssatz zuzüglich eines schmutzfrachtbezogenen Gebührenanteiles. Dieser wird nur dann berücksichtigt, wenn die eingebrachte Schmutzfracht den Grenzwert von 100 Berechnungs-EGW überschreitet. Werden von einer Liegenschaft in das Kanalsystem Schmutzwässer und Niederschlagswässer eingeleitet, so gelangt in diesem Fall ein um 10 % erhöhter Einheitssatz zur Anwendung.