Matthias Harnisch

Restoration of floodplain-meadows along the northern Upper Rhine - some practical aspects

Riedstadt
Federal Agency for Nature Conservation
German Foundation for the environment
JUSTUS-LIEBIG-UNIVERSITÄT GIESSEN
Federal State of Hesse
Frankfurt Airport

Intro: scientifical poetry taken from Sir Charles Lyell, Elements of Geology, 1837

Dipl-Ing. M. Harnisch
Landscape Architect
City of Riedstadt
Rathausplatz 1
D-64560 Riedstadt
www.riedstadt.de
www.stromtalwiesen.de

1 Introduction / Aims

2 Starting Point

3 Project Area

4 Restoration Measures

5 Agricultural use

6 Public relations

7 Financing

8 Results and Conclusions

Dipl-Ing. M. Harnisch
Landscape Architect
City of Riedstadt
Rathausplatz 1
D-64560 Riedstadt
www.riedstadt.de
www.stromtalwiesen.de

Starting Point

1983: demolition of the inner dyke-system of the nature reserve „Kühkopf-Knoblochsaue“ by a big flood

In consequence: 300 ha of former arable land were changed into woods (150 ha) and grasslands (150 ha, by means of controlled succession)

Now, after 27 years, in spite of suitable ecological conditions on these new meadows:

- still low number of species,
- prevailing trivial and common species,
- no rare floodplain-meadow species

Dipl-Ing. M. Harnisch
Landscape Architect
City of Riedstadt
Rathausplatz 1
D-64560 Riedstadt
www.riedstadt.de
www.stromtalwiesen.de

So, as

- the ecological site conditions are favourable,
- highly valuable species-rich floodplain meadows are nearby (distances lower than 1 km),
- the new meadows are – after the partly destruction of the dykes in 1983 – regularly flooded,
- the management of the new meadows aims at the development of floodplain-meadows

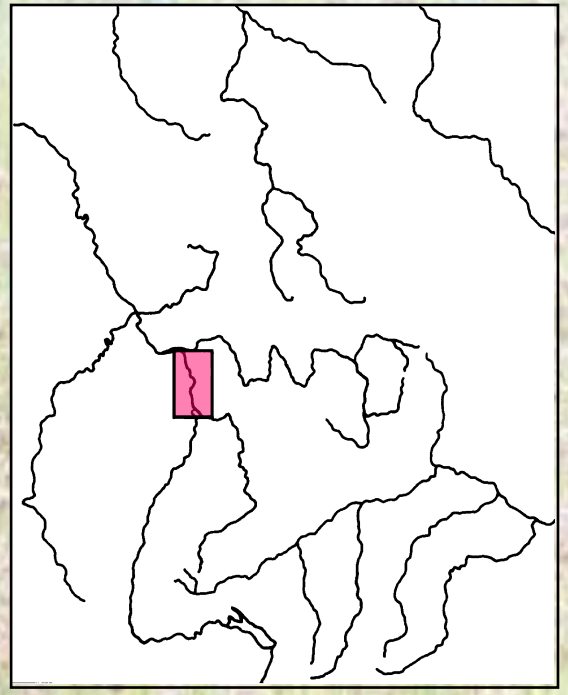
- Why did no target species occur after now 27 years? and
- What are the limiting factors?

Dipl-Ing. M. Harnisch
Landscape Architect
City of Riedstadt
Rathausplatz 1
D-64560 Riedstadt
www.riedstadt.de
www.stromtalwiesen.de

- Many of the target species do not build up a persisting soil seed-bank (about 50 %)
- Many of the target species are characterised by very small dispersal distances (usually < 1 m/year)
- Seemingly no effective transfer of propagules through regularly occurring floods, in spite of stands with target species nearby
- Old means of dispersal do not exist anymore in modern agricultural landscapes (as e.g. random dispersion through loss of seeds in course of haymaking/transport, transfer with cattle ect.)

➢ **Limiting factor:**
Lack of effective dispersal of target species.

Project Area



Riedstadt, 40 km south-west to Frankfurt / M., in the Holocene floodplain of the northern Upper Rhine

60 ha along both sides of the main dyke, thus including areas in the functional as well as in the fossil floodplain

21 ha bought from federal subsidies

24 ha contributed by the municipality of Riedstadt

15 ha contributed by the Federal State of Hesse

Dipl-Ing. M. Harnisch
Landscape Architect
City of Riedstadt
Rathausplatz 1
D-64560 Riedstadt
www.riedstadt.de
www.stromtalwiesen.de

Ecological conditions:

- Warm and dry climate

  (Average annual temperature: 10-11° C;
  Average annual precipitation: 550 mm)

- Extreme change of water conditions

  (up to 7 m between lowest and highest water-level)

- Non-intensive agricultural utilisation

  (1 max. 2 cuts / year, no fertilizers)

January 2003

June 2002

Dipl-Ing. M. Harnisch
Landscape Architect
City of Riedstadt
Rathausplatz 1
D-64560 Riedstadt
www.riedstadt.de
www.stromtalwiesen.de

Dipl-Ing. M. Harnisch
Landscape Architect
City of Riedstadt
Rathausplatz 1
D-64560 Riedstadt
www.riedstadt.de
www.stromtalwiesen.de

- Individual- and species-rich remnant stands of floodplain-meadows at the Hessian Upper Rhine
- Two types: Alliances *Cnidion* and *Molinion*, both protected according to appendix 1 of the Flora-Fauna-Habitat directive of the EU
- In Central Europe *Cnidion*-meadows are one of the most endangered plant communities
- Many typical species reach in the study area the north-western limits of their distribution (e.g.: *Allium angulosum, Cnidium dubium, Scutellaria hastifolia, Viola pumila*)

Dipl-Ing. M. Harnisch
Landscape Architect
City of Riedstadt
Rathausplatz 1
D-64560 Riedstadt
www.riedstadt.de
www.stromtalwiesen.de

Restoration Measures

Dipl-Ing. M. Harnisch
Landscape Architect
City of Riedstadt
Rathausplatz 1
D-64560 Riedstadt
www.riedstadt.de
www.stromtalwiesen.de

Aims

Enlargement of highly rare species-rich floodplain meadows

Restitution of an old element of the cultural landscape

Testing of diaspore transfer with plant-material as a restoration measure

The implementation of an agricultural utilisation system

Assessment of ecology and population biology of flora and fauna in floodplain meadows.

Diaspore transfer with plant material

Time of transfer: September - November

Application in strips of 5 to 10 m width, 10-15 cm thick

Transfer with a loader-wagon

Dipl-Ing. M. Harnisch
Landscape Architect
City of Riedstadt
Rathausplatz 1
D-64560 Riedstadt
www.riedstadt.de
www.stromtalwiesen.de

Preparation of Restoration Sites: Rotovading

Rotovated stripes on species-poor grassland;
onto these the plant-material will be spread out

Donor-site: cut and swathed, ready for picking-up

Picking up the swathe with the loader wagon

The pick-up of the loader wagon

Spreading the plant-material machanically…


…and by hand (the finishing touches)

Stripes with plant-material in the aftermath

Sibirian Iris
(Iris sibirica)

Blue Iris
(Iris spuria)

Spear-leaved Skullcap
(Scutellaria hastifolia)

Tall Violet
(Viola elatior)

Meadow Violet
(*Viola pumila)*

Fen Violet
(*Viola stagnina)*

Saw Wort
(Succisa pratensis)

Marsh Gentian
(Gentiana pneumonanthe)

Devil´s-bit Scabious
(Succisa pratensis)

Mouse Garlic
(Allium angulosum)

Dipl-Ing. M. Harnisch
Landscape Architect
City of Riedstadt
Rathausplatz 1
D-64560 Riedstadt
www.riedstadt.de
www.stromtalwiesen.de

Additional measure: collection and spreading out of autochthonal seeds

Dipl-Ing. M. Harnisch
Landscape Architect
City of Riedstadt
Rathausplatz 1
D-64560 Riedstadt
www.riedstadt.de
www.stromtalwiesen.de

Agricultural use

Dipl-Ing. M. Harnisch
Landscape Architect
City of Riedstadt
Rathausplatz 1
D-64560 Riedstadt
www.riedstadt.de
www.stromtalwiesen.de

Agricultural use

Implementation of a sustainable agricultural utilisation system

Integration of local farmers from the very beginning

- Initial road show with local farmers and representatives of farming administration
- Additional meetings and excursions with interested farmers and representatives
- Restoration measures conducted by local farmers
- Restored meadows leased to farmers at low cost

A high and long-term demand for late-cut and species-rich hay to feed horses
(hay from the project area is sold even to NL or CH, even Spain)

Good fodder-quality for horses and beef-cattle

A local shepherd is in need of pastures and hay, too

Implementation of a manifold utilisation system, including:

- Meadows, 1-2 cuts
- Meadows, one cut, aftermath grazing (sheep)
- Pastures (for sheep), with aftermath / mulching

Regular agricultural use starts 2 or 3 years after restoration measures, until then mulching once a year

Public relations

Public relations

PR regarded as important from the very beginning

PR directed to the scientific and professional community as well as for the local population

Manifold means of communication:

- Mass media (Press, specialised press, Radio, TV)
- Internet (www.stromtalwiesen.de)
- Excursions / Guided tours
- Lectures / Conferences / Congresses
- Cooperation with educational establishments (e.g. adult education centre)

Dipl-Ing. M. Harnisch
Landscape Architect
City of Riedstadt
Rathausplatz 1
D-64560 Riedstadt
www.riedstadt.de
www.stromtalwiesen.de

Dipl-Ing. M. Harnisch
Landscape Architect
City of Riedstadt
Rathausplatz 1
D-64560 Riedstadt
www.riedstadt.de
www.stromtalwiesen.de

Dipl-Ing. M. Harnisch
Landscape Architect
City of Riedstadt
Rathausplatz 1
D-64560 Riedstadt
www.riedstadt.de
www.stromtalwiesen.de

Financing

From November 2000 until July 2005:

Federal agency for nature conservation:

76 % (Purchase of land, personnel costs project coordination, Restoration measures)

Federal state of Hesse:

11 % (Provision of land, restoration measures)

Municipality of Riedstadt:

13 % (Provision of land, office and equipment)

Since July 2005 until the End of 2006 and since 2009:

100 % municipality of Riedstadt

thanks to a major donation (100.000,- € and 20.000,- €) of the Frankfurt Airport Company

Fraport

2007 and 2008:

German Foundation for the environment: 50 %

Municipality of Riedstadt: 50 %
(Fraport-Donation)

Dipl-Ing. M. Harnisch
Landscape Architect
City of Riedstadt
Rathausplatz 1
D-64560 Riedstadt
www.riedstadt.de
www.stromtalwiesen.de

Results and Conclusions

Diaspore transfer with plant material is a very effective and cheap measure for the restoration of rare grassland-communities

Since the beginning (2000) we could establish more than 100 species, thereof 34 species of the Red Lists

It requires:

- Donor-sites of high quality (species- and individual-rich) and similar ecological conditions nearby
- Effective organisation and good timing
- Extensive mutual information
- Integration in the local agricultural management system

Dipl-Ing. M. Harnisch
Landscape Architect
City of Riedstadt
Rathausplatz 1
D-64560 Riedstadt
www.riedstadt.de
www.stromtalwiesen.de

Thank you for your attention !

Any questions ??

Dipl-Ing. M. Harnisch
Landscape Architect
City of Riedstadt
Rathausplatz 1
D-64560 Riedstadt
www.riedstadt.de
www.stromtalwiesen.de

Thanks to

Dr. Tobias W. Donath, University of Giessen

Prof. Dr. Norbert Hölzel, University of Münster

and all the many others involved