MONITORING LIFE+ ZTAR

ZWIN TIDAL AREA RESTORATION

Dr Eric Cosyns & Arnout Zwaenepoel
Nature & Landscape Unit

15.09.2015
About WVI
ABOUT WVI

• Service rendering public company:
  • Spatial planning, mobility and GIS;
  • Environmental issues, Climate change & Energy efficiency;
  • Nature management & landscaping projects;
  • Monitoring of nature management & restoration projects;
  • Etno-ecological & historical-ecological studies
MONITORING LIFE+ ZTAR
Zwin management & monitoring study (2009-2015)

Management plan

T₀-Monitoring
(to underpin management plan & vision)

Monitoring

Hydrogeologic model & Inventories

- Topography
- Sedimentation-erosion
- Macrobenthos & nekton
- Avifauna
- Invertebrates
- (Flora)
- Vegetation (salt marsh)

ZTAR - nature restoration & development of new salt marsh area

1st report MP (2011)
Management plan (2012)
1st monitoring report
Final report (2015)
Nature conservation policy and nature management

ZTAR 2011-2015:

1. Depoldering 2016-2018
2. Monitoring 2019-2034

New salt marsh area
ZTAR NATURE RESTORATION – SITUATION 2014

Seabirds breeding islands

Sod cut area 8 ha
Monitoring Life+ ZTAR

Management plan

T₀-Monitoring
(to underpin management plan & vision)

Monitoring

Inventories
- Topography
- Sedimentation-erosion
- Macrobenothos & nekton
- Avifauna
- Invertebrates
- (Flora)
- Vegetation (salt marsh)

ZTAR 2011-2014(/16)

1st report MP (2011)

Management plan (2012)

ZTAR-monitoring report (2015)
<table>
<thead>
<tr>
<th>Study Type</th>
<th>Organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sedimentation-erosion / microtopography</td>
<td>INBO</td>
</tr>
<tr>
<td>Floristic survey + detailed mapping of rare species</td>
<td>INBO</td>
</tr>
<tr>
<td>Vegetation survey (t1 + t2 – 2013 -2014)</td>
<td>Wvi</td>
</tr>
<tr>
<td>Macrobenthos &amp; Nekton (t1)</td>
<td>UG-Marbiol</td>
</tr>
<tr>
<td>Breeding birds (t1)</td>
<td>Natuurpuntstudie</td>
</tr>
<tr>
<td>Amphibians (Tree frog &amp; Natterjack toad)</td>
<td>Natuurpuntstudie</td>
</tr>
<tr>
<td>Invertebrates (ground dwelling beetles, arachnidae, ants, dragonflies, butterflies, … (t1 – pit fall)</td>
<td>Natuurpuntstudie</td>
</tr>
<tr>
<td>Other biota: Woodlice, Diptera, Moths, ...</td>
<td>Volunteers</td>
</tr>
</tbody>
</table>
ZTAR-MONITORING
VEGETATION SURVEY
ZTAR-MONITORING – VEGETATION SURVEY

- 23 transects (salt marsh area, stratified random design, gradients)
  - T0 - 2010
  - T1 - 2013 surveys
  - T2 - 2014

- Effects of natural processes and nature management?
<table>
<thead>
<tr>
<th>Plant species (2010-2014)</th>
<th>Cattle grazing</th>
<th>Sod cutting (2013-14)</th>
<th>Natural processo</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agrostis stolonifera</td>
<td>++</td>
<td></td>
<td>Status Quo</td>
</tr>
<tr>
<td>Aster tripolium (EU-H 1330)</td>
<td>--</td>
<td></td>
<td>SQ/-</td>
</tr>
<tr>
<td>Carex distans</td>
<td>++</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elymus athericus</td>
<td>SQ</td>
<td></td>
<td>++</td>
</tr>
<tr>
<td>Festuca rubra</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Galium verum</td>
<td>++</td>
<td></td>
<td>SQ</td>
</tr>
<tr>
<td>Glaux maritima</td>
<td>SQ</td>
<td></td>
<td>--</td>
</tr>
<tr>
<td>Halimione portulacoides (EU-H 1330)</td>
<td>SQ</td>
<td></td>
<td>--</td>
</tr>
<tr>
<td>Juncus gerardii</td>
<td>SQ</td>
<td></td>
<td>SQ</td>
</tr>
<tr>
<td>Juncus maritimus</td>
<td>SQ</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Limonium vulgare (EU-H 1330)</td>
<td>++</td>
<td></td>
<td>SQ/-</td>
</tr>
<tr>
<td>Lotus corniculatus</td>
<td>++</td>
<td></td>
<td>SQ/-</td>
</tr>
<tr>
<td>Poa pratensis</td>
<td>SQ</td>
<td></td>
<td>--</td>
</tr>
<tr>
<td>Puccinellia maritima (EU-H 1330)</td>
<td>++</td>
<td></td>
<td>-/+</td>
</tr>
<tr>
<td>Salicornia species (Eu-H 1310)</td>
<td>++</td>
<td>++</td>
<td>--</td>
</tr>
<tr>
<td>Suaeda maritima (Eu-H 1310)</td>
<td>++</td>
<td>++</td>
<td>--</td>
</tr>
</tbody>
</table>
• Effects of nature management

• Sod cutting & soil removal

Obvious results

• **Set back of succession** (*Elymus athericus* removed)
• **Salt Pioneers established**
ZTAR-MONITORING – VEGETATION SURVEY - CONCLUSIONS

- Effects of nature management
- Sod cutting & soil removal

Obvious results
- Set back of succession (*Elymus athericus* removed)
- Salt Pioneers established

But how sustainable?
- Follow up nature management e.g. extensive cattle grazing will be necessary to slow down succession & increase biodiversity (already done by now)

- Hydrodynamics are very important and will affect the outcome of vegetation succession
- Hydrodynamics themselves are altered by external activities (e.g. dredging, sand suppletion, harbour activities, depoldering activity…)
Effects of nature management

Cattle grazing (2010-2014)

→ Succession slowed down
  • After 4 years: *Elymus athericus* still dominant species, but its biomass decreased
    But,
    Without grazing: Elymus would have spread much more
    → i.e. botanical diversity would have decreased

• After 4 years: characteristic **pioneer and early salt marsh** succession species are still present under grazing;
• moreover some spp show higher cover and spread along the transect
  << without grazing these species tend to disappear & their cover decreased.
Without nature management
We observed a rapid and strong decline of pioneer habitat (Eu-1310) in favour of *Glauco-Puccinellietalia maritimae* communities in the lower salt marsh. However also the latter showed a net loss of cover. Overall *Elymus athericus* became more dominant in the salt marsh.

Grazing is able to slow down this natural succession,
Sod cutting (& soil removal) set back natural succession

→ Trampling creates small gaps that favour pioneer species whereas grazing alters light concurrence and litter accumulation.
→ Sod cutting and topsoil removal is a drastic measure pushing back vegetation succession to the initial pioneer state. As diasporas of target species are well available the preferred EU-habitats established almost immediately
BUT !!

Overall observed vegetation shift (observed within transects and over the whole saltmarsh)

Means decline of pioneer and low salt marsh communities (Eu-1310) in favour of communities of fresh and +/- dry conditions (Lolio potentillion, Elymus stands, dune grasslands)

Not as a result of increased sedimentation rates but rather of significant (rapid?) changes in hydrodynamics in the salt marsh i.e. inundation frequency & duration.

• → Maybe the result of sand deposition in the Zwin estuary → decreasing watervolumes in tidal creeks
Hydrodynamics are of main importance to understand vegetation succession in the Zwin tidal area (more than sedimentation/erosion is)

Future monitoring programs should also focus on this factor