Ecological monitoring along the Belgium coast

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This talk...

- About ecological monitoring
- Challenges along the Belgian coast
- Overview & examples
- Conclusions & recommendations
Ecological monitoring...
Current biodiversity issues

- Decline of coastal dynamics
- Habitat loss & fragmentation
- Succession (grass/scrub encroachment)
- Invasive alien species
- Tourist pressure
- Groundwater extraction
- Agriculture
- Atmospherical deposition
- Climate change
...
Monitoring need

1) Nature conservation

- ‘Biodiversity Status’ + management evaluation
- Natura 2000, sustainability indicators (Coastal Compass)...

2) Ecosystem services/uses

- E.g. coastal protection (barrier strength), recreation, ...
- Ecological impact
Monitoring need

- Coast = exceptionally rich & specific
- Belgian coast: ± 20 000 species
- Human pressure = high
- Large investment in nature restoration (LIFE)
What is the problem?

- Large overlap in information needs
- Resource limitation & fragmentation
- Many initiatives (e.g. MONAIJ, PINK, ZTAR, ...)
- Lack of continuity
- Lack of information exchange
- No coherent ecological monitoring program
Strategy

General ecosystem monitoring

(←→ Project based, targeted monitoring)

→ Basic inventory (holistic), long term
→ System status + change detection (multiple goals)
→ Solid foundation for scientific hypothesis
→ Integration: pool resources & demands
→ Based on understanding of the system & common sense
→ Robust; independence of ‘trends’ in society
Strategy

ECOSYSTEM

- Abiotic variables
- Habitat level
- Species level

SOCIETY

- Land ownership
- Management database
- Tourist infrastructure
- ...

www.inbo.be
Monitoring in practice
I) Abiotic variables

- Meteorology
- Geomorphology
- Hydrology/Hydrography
- Soil
Meteorology

- Many processes strongly climate dependant
- Climate change
- Royal Meteorological Institute = federal organisation...
Geomorphology $\rightarrow$ elevation models

- Beach (2x / year): LiDAR
- Dynamic dunes & salt marsh (± 1x / 3 years)

- Geomorphodynamics = essential characteristic of coastal systems
- Data acquisition by coastal protection agency
- Future ...?
Geomorphology → Salt marsh

- Cm-changes
- GPS + Sed-Ero plots
- Impact assessment (dredging, ...)
- Integration with LiDAR
- No long term resources
II) Habitat level

- Vegetation mapping
- Permanent plots
- Aquatic vegetation (ponds)
Vegetation mapping

- Detailed vegetation map 1/1500
- Vegetation dynamics
- Management planning & evaluation
- Research: habitat modelling...
- So far about 1/3 of coast mapped

Fixed typology
(several 100s types)

- Class
- Code
- Dominant
- Subdominant
Accountancy of habitat types
Automated translation to Natura 2000 types
Maintain detail + quality information
Still not really accepted as method
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Remote sensing ??

- LiDAR Vegetation height
- Excellent scrub & woodland discrimination

Kempeneers et al. 2009 – Journal of Coastal Research
Remote sensing

- Multispectral images
- Discrimination within low vegetation
- Complementary to LiDAR

Diagram showing discrimination within low vegetation using multispectral images.
Remote sensing

- Satisfactory classification of general vegetation (structure) types in dunes (salt marsh...??)
- Vegetation mapping program of coastal protection agency stopped
Vegetation plots

- Process evaluation (e.g. grazing management)
- Habitat evaluation
- Habitat quality assessment (Natura 2000 reporting)
- Dunes: actually 280 → to be extended tot 600
Vegetation plots

- Salt marsh → transects
- Not used for Natura 2000 quality assessment?
III) Species level

- Flora
- Cryptogams & fungi
- Mammals
- Birds
- Amphibians & reptiles
- Invertebrates
Flora

- About 260 rare (indicator/target) species
- Mapping of entire population
- Actually > 100 000 records
Flora

Sampling

Mapping of entire population

Abundance (# squares)

Rank
Asparagus prostratus
Flora

- Powerful evaluation tool
- Future uncertain
Cryptogams, fauna & fungi

- Specific habitat quality indicators
  - Fungi & beetles in marram dune
  - Snails in salt marsh or dune woodland

- Animals with large home range → Landscape evaluation

- Little fauna monitoring set up or continued...
Species

- Need for cooperation with volunteers
- So far little coordinated action
Conclusions

- Basic ecological monitoring

- Integration
  - Policy levels (e.g. Natura 2000 ↔ management)
  - Sector needs (e.g. biodiversity and coastal protection)
  - Management & research needs (entangled!)
  - Resources

- Biogeographical level (Atlantic Europe)
Conclusions

- ICZM
  - Need for powerful ICZM organisation
  - Higher policy level (umbrella)

- Financial implications
  - Small compared to current investments
  - Organisation >> cost
  - Long term perspective