

# Identification of benthic habitats using drop-down video equipment and verification of results

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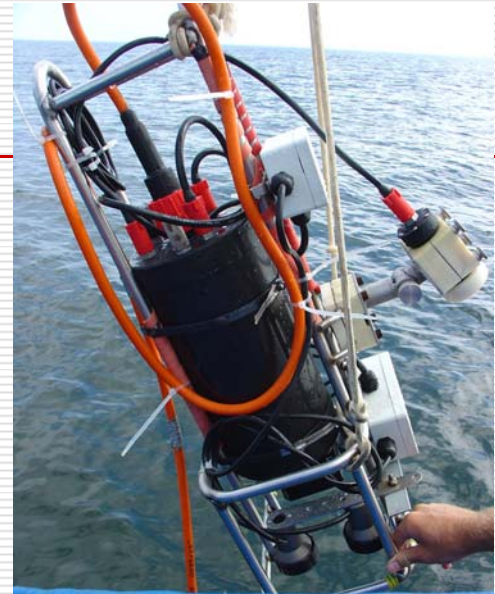
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# Equipment

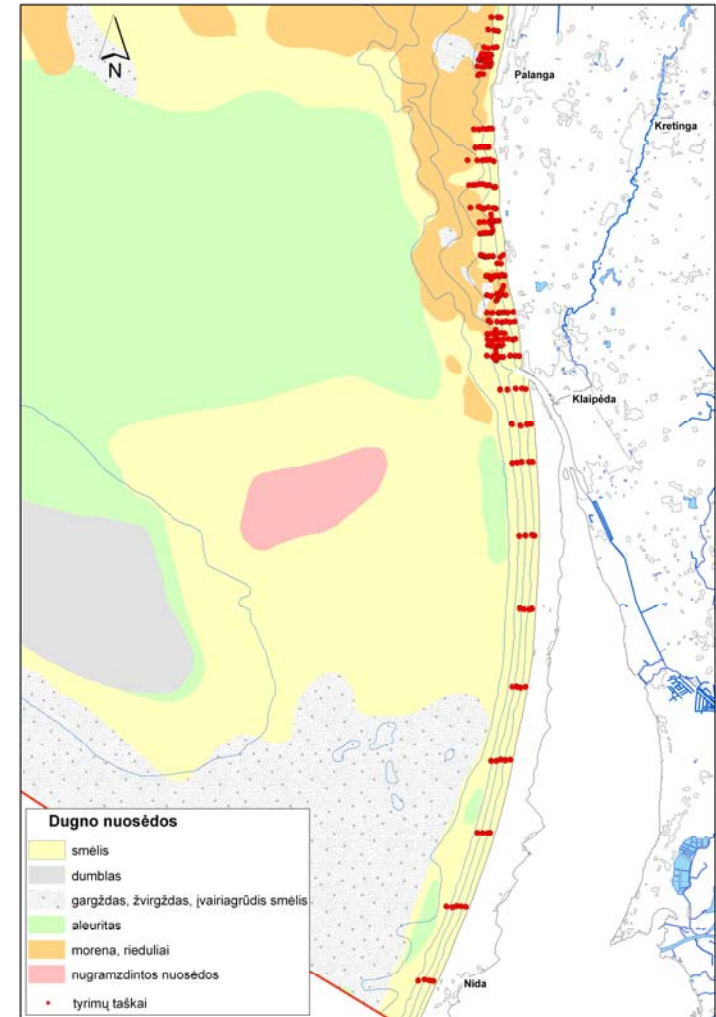
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- ❑ System contain 2 parts:  
underwater box and control unit
- ❑ Underwater box include 2 video cameras (color and black-white), lights (4\*50 watt), depth sensor and 2 lasers to estimate size of observed objects
- ❑ Video from underwater box in real-time transmitted into the control unit, where readings from depth sensor, GPS coordinates, and some additional information embedded into the video. Video recorded in miniDV cassette



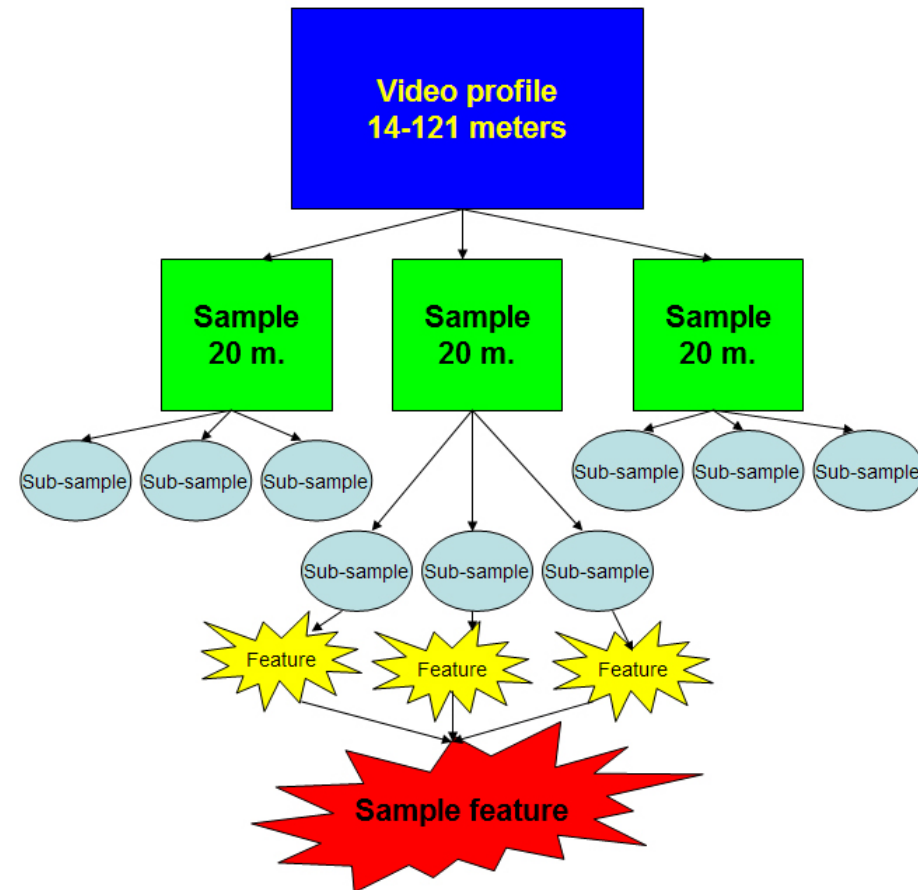
# Filming

- Video profiles are grouped in transects
- 202 video profiles in 37 transects were made
- During filming camera was descended vertically, and hovered over the bottom not touching it. Distance to the bottom was approximately 0.2-0.5 m, and controlled manually, using video stream
- Video profiles duration was 3 minutes, but their lengths varied due to the differences in boat drifting, which wasn't controlled



# Data analysis: the video samples

- Using GPS coordinates embedded in video the exact position of each video profile was defined and their lengths were calculated
- The length of video profiles ranged from 14 to 121 meters (average 42 meters)
- The profiles were divided into 20 m segments, each treated as a separate sample
- In total 413 samples received
- For the convenience of treatment, each sample was further divided into 3 sub-samples and both, abiotic and biotic features were calculated



# Data analysis: visual features

- In total, 8 abiotic and 10 biotic visual features were identified and estimated
- All features were either quantitative (depth, meters and coverage, %) or alternative (presence/absence in a sub-sample)

Sand ripples	Points, 0 to 3
Sand	Coverage, %
Pebble	Coverage, %
Gravel	Coverage, %
Mud	Coverage, %
Clay	Coverage, %
Boulders	Coverage, %
Depth	Meters
<i>B. improvisus</i>	Coverage, %
<i>B. improvisus</i> and <i>M. edulis</i>	Coverage, %
<i>P. elegans</i>	Points, 0 to 3
<i>Hydrozoa</i>	Points, 0 to 3
Brown filamentous algae	Points, 0 to 3
<i>F. lumbricalis</i>	Coverage, %
Green filamentous algae	Coverage, %
<i>Polysiphonia</i>	Coverage, %
<i>Ceramium sp.</i>	Coverage, %
Brown algae	Coverage, %

# Data analysis: statistical treatment

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- ❑ Only biotic features were used in statistical analysis
  - ❑ Bray-Curtis similarity was used to create similarity matrix, hierarchical cluster analysis was used to distinguish sample groups and Multi Dimensional Scaling (MDS) to check those groups
  - ❑ After analysis 6 sample groups were distinguished
  - ❑ Each group represent type of biotope
  - ❑ Abiotic attributes were added to biotic and main biotopes features were described
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# Biotores, soft bottom

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- Depth range: 2-4 m
- Substrate: sand, boulders up to 50%
- Dominant animals: *B. improvisus*
- Dominant algae: green filamentous



- Depth range: 6-11 m
  - Substrate: sand, boulders up to 10%
  - Dominant animals: *P. elegans*
  - Dominant algae: none
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# Biotores, hard and mixed bottom

- Depth range: 4-6 m
  - Substrate: boulders
  - Dominant animals: *M. edulis*, *B. improvisus*
  - Dominant algae: *Polysiphonia*
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- Depth range: 6-8 m
  - Substrate: boulders (70-90%)
  - Dominant animals: *M. edulis*, *B. improvisus*
  - Dominant algae: *F. lumbricalis*



# Biotores, hard and mixed bottom

- Depth range: 8-14 m
- Substrate: boulders (70-80%)
- Dominant animals: *M. edulis*, *B. improvisus*
- Dominant algae: none

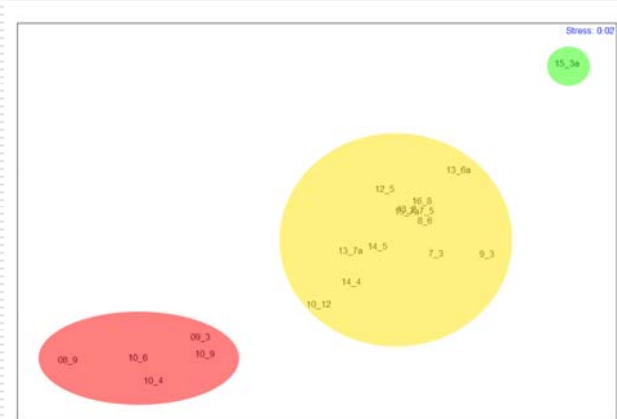
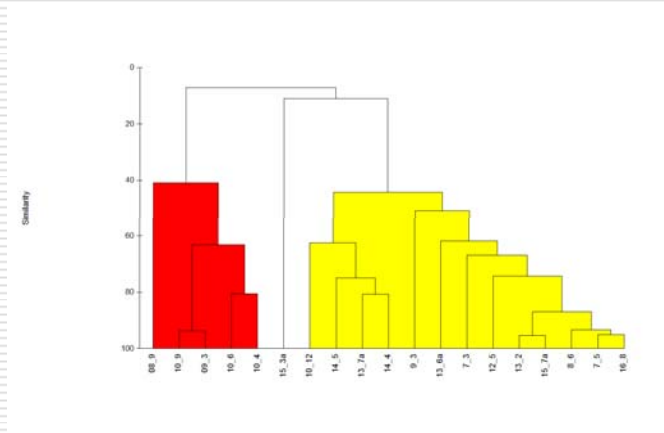


- Depth range: 8-14 m
- Substrate: sand, boulders up to 40%
- Dominant animals: *B. improvisus*, *P. elegans*
- Dominant algae: none



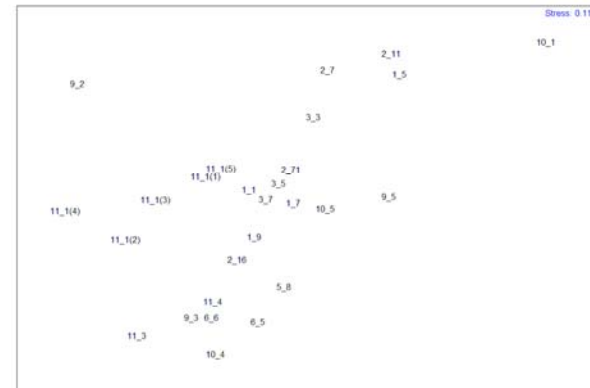
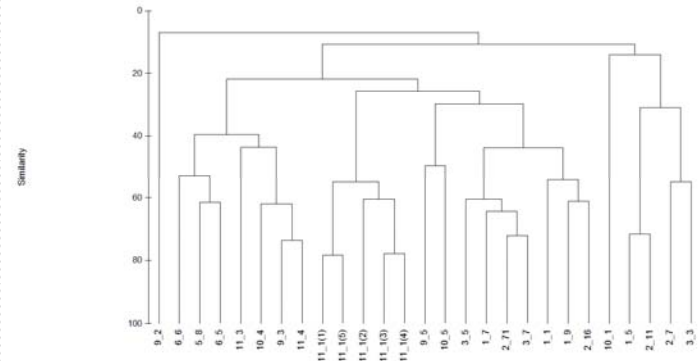
# Results verification, hard bottom

- Benthic samples were taken by SCUBA divers using 20\*20 cm frame
- 56 samples taken from 19 locations close to the video profiles were used
- The benthic samples were grouped by biomass of benthic fauna
  - (most of them epifaunal species, no data on algae was used)
- Good match with the results from video was found



# Results verification, soft bottom

- 27 benthic samples taken with Van Veen grab in the area of video profiling were used
- Samples were grouped using biomass of benthic fauna
- Most of that species are infaunal (hence, hardly detectable visually)
- The comparative analysis suggests that in soft bottom might be more biotopes, then it was distinguished from video

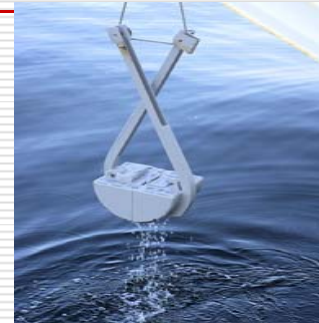


# Areas covered by different methods

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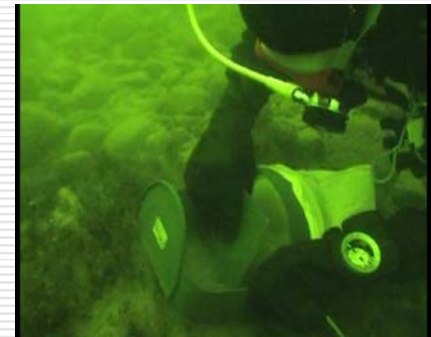
## □ Soft bottom

- 27 Van Veen grabs: 2.7 m<sup>2</sup>



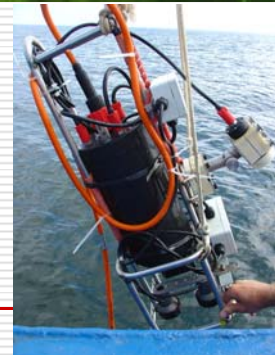
## □ Hard bottom

- SCUBA divers, 56 samples: 2.24 m<sup>2</sup>



## □ Video profiling

- 10 hours of video: about 4000 m<sup>2</sup>



# Conclusion

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- ❑ The statistical analysis of video samples from hard bottom gives comparable results with more labor intensive traditional method (SCUBA diving sample, treatment of samples in lab)
  - ❑ Using video on soft bottoms it is difficult to distinguish benthic biotopes dependent on infaunal organisms
  - ❑ Remote underwater video systems allow to cover much larger areas than traditional benthic sampling methods
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Thank for your attention!

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