


Universität für Bodenkultur Wien

Hydrographic surveying of small Alpine rivers

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EU-Water Framework Directive (WFD)

- > 2003 Implementation of EU-WFD in national law
- > Protection and enhancement of aquatic ecosystems
- > 2015 Achievement of „good condition“ of all water bodies
- > Ensure the “good condition“ of water bodies
- > Reduction of impacts of flood and drouth



Hydraulic modelling to define measures

- > multi-dimensional numeric flow modelling
- > simulation of a dynamic river bed
- > DTM's of high quality required
 - high density of measurement points of the entire river section
 - accuracy in height better than 10cm



Documentation of the actual situation

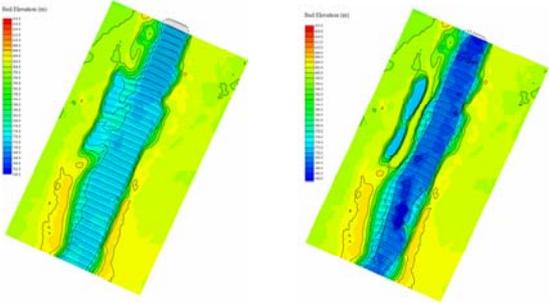


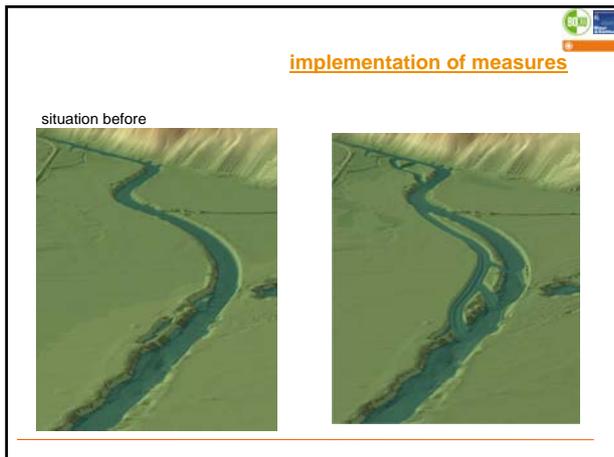
Morphology:

- Variation of broadness and depth
- Structure of the riverbed
- structure of the river bank



Hydraulic simulation of planned measures



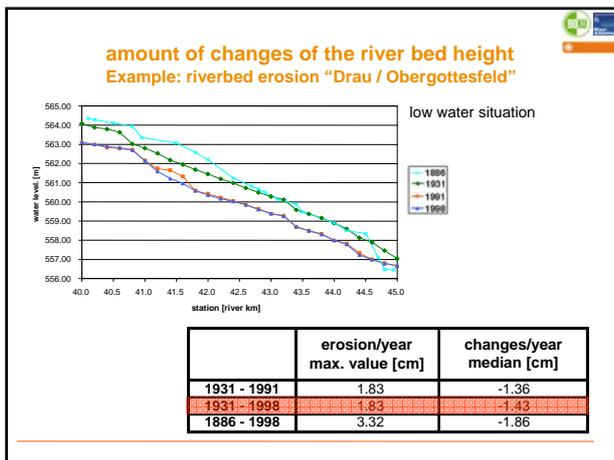


control of success - monitoring of water bodies

comparative analysis

- habitat availableness for benthic fauna /fish
- water level after flood occurrence
- changes of the river bed (erosion, alluvial deposit)

within 3 years



Requirements on hydrographic surveying of alpine rivers

hydraulic 2D-modelling monitoring of water bodies

high density of measurements

accuracy in height better than 10cm

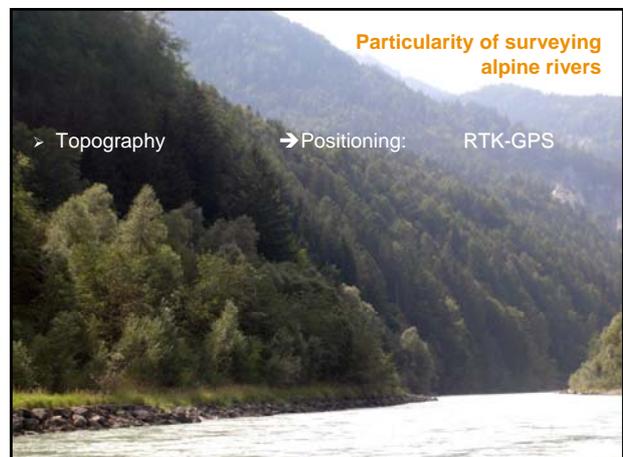
real time; efficient

state of the art hydrographic surveying systems

which are used for bathymetry or on large rivers

cannot be applied due to the specific topography

of small alpine rivers



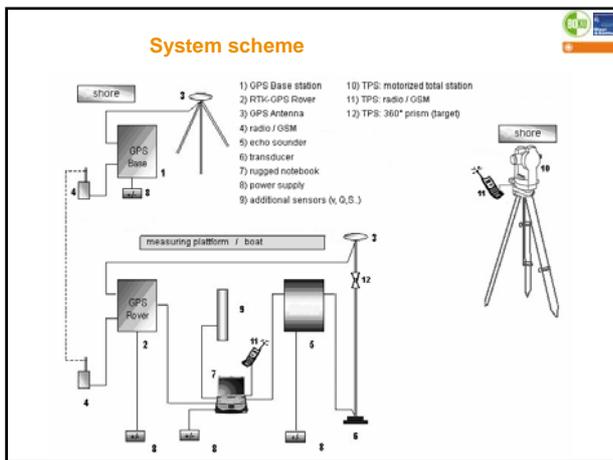
Influences of the topography

- > steep river banks
- > high and dense vegetation overhangs the watersurface
- > 60% to 85% RTKGPS positioning successful
- > predetermination impossible
- > RTK-„dead areas“ will be discovered in the field



Particularity of surveying alpine rivers

- > Topography → positioning: RTK-GPS
not for all river sections successful
- target tracking servo tachymeter
not efficient in stand alone operation
- > turbulent water conditions → pitch and roll correction needed
- > shallow water zones narrow river bed obstacles (boulders) → limited boat size
manoeuvre within limitations (stop and go, reversing ...)

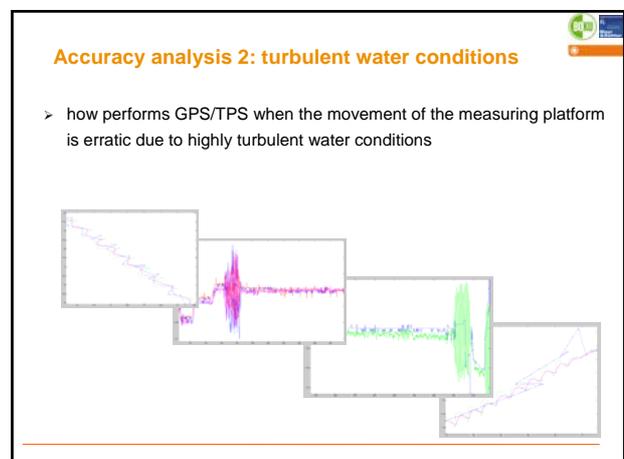
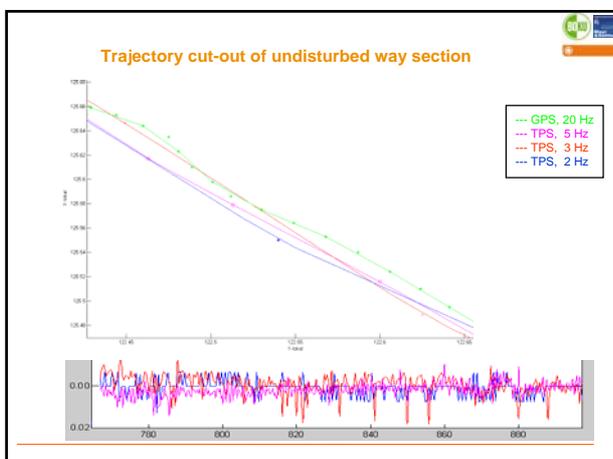


Accuracy analysis and system calibration

To establish the system performance investigations at two different test sites were undertaken



- > Test site 1: Danube river tributary - low current



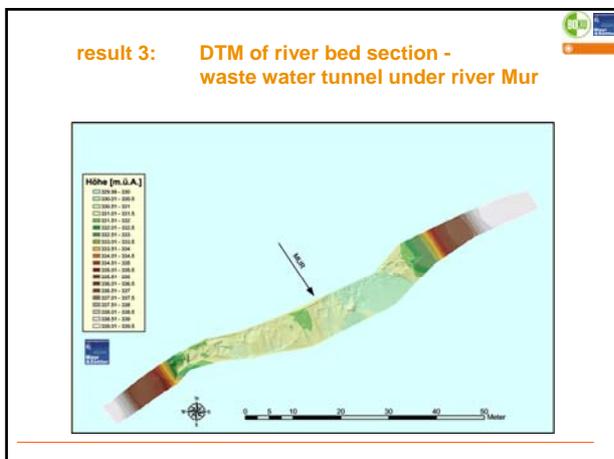
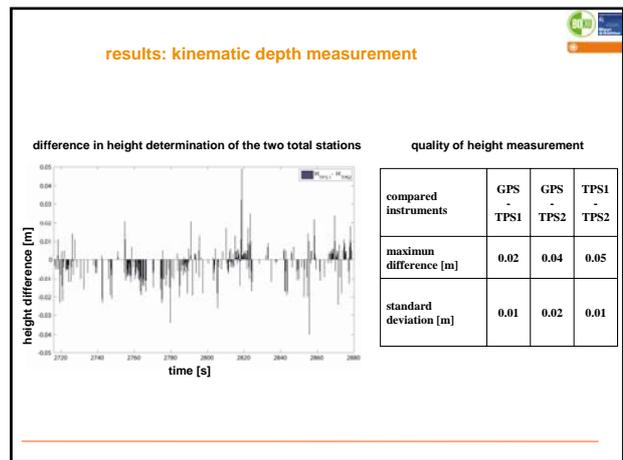
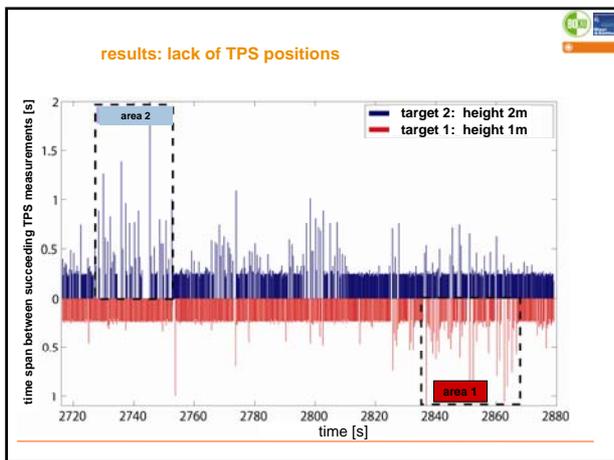
Test site 2: river Mur

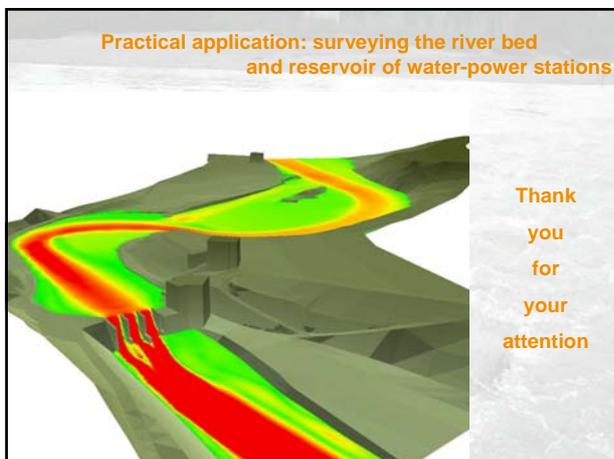
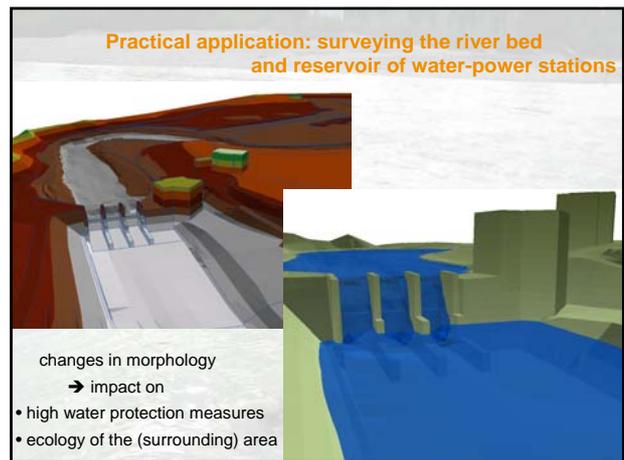
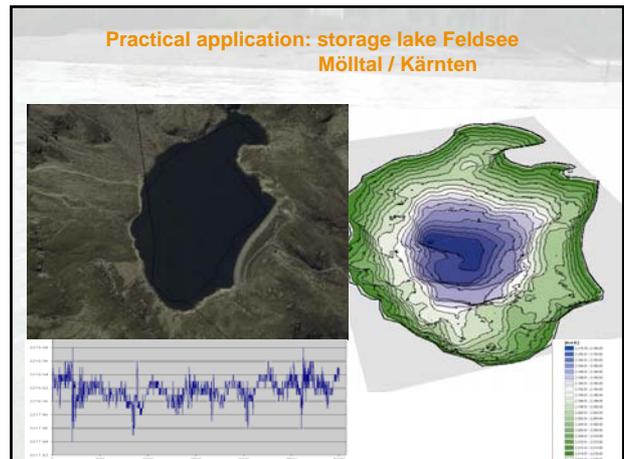
- low depth of water
- strong currents
- highly turbulent
- stone obstacles
- steep river banks



components of the system

- on board: 3 GPS RTK rover
2 coaxial mounted TPS prisms (360°)
- motorized total stations with automatic target recognition at the river banks
- 1 GPS reference station
- CPU on board
- Telemetry





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