ASCOR
Arsenic Contamination of Ogosta River: Linking biogeochemical processes in floodplain soils with river system dynamics

BENEFITS FOR LOCAL COMMUNITIES

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NIGGG-BAS
IBPD-ETH Zurich
Ogosta River, NW Bulgaria
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- Mining of Fe, Pb/Ag, and Au from 1951-1999
- Tailings pond dam failure in 1964 (~100,000 m³)
- Direct discharge of waste slurries from 1964-1979
- Numerous waste rock dumps and ~3.5 mln t of ore waste stored in three tailings impoundments
- Impoundments were "remediated", but floodplains remain heavily contaminated (140 km from Chiprovtsi to Danube)
ASCOR itself

- ASCOR goals
  - Spatial distribution of As contamination in floodplain soils
  - Arsenic release from soils to river and groundwater
  - Integration of molecular and river-system scale information on As fate in the Ogosta Valley
Expected ASCOR products/output

- Detailed DEM and orthophoto mosaics of the Ogosta Valley
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- Detailed DEM and orthophoto mosaics of the Ogosta Valley
- Detailed map of As soil contamination
Expected ASCOR products/output
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- Detailed DEM and orthophoto mosaics of the Ogosta Valley
- Detailed map of As soil contamination
- Hot spots of groundwater pollution outlined
Expected ASCOR products/output

As (ppb), November 2014

- <10
- 10-30
- 30-50
- 50-100
- 100-300
- 300-500
- >500

- Studied area
- Settlements
- Rivers
Expected ASCOR products/output

- Detailed DEM and orthophoto mosaics of the Ogosta Valley
- Detailed map of As soil contamination
- Hot spots of groundwater pollution outlined
- Flooding maps
Expected ASCOR products/output
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- Detailed DEM and orthophoto mosaics of the Ogosta Valley
- Detailed map of As soil contamination
- Hot spots of groundwater pollution outlined
- Flooding maps
- River and groundwater monitoring system
Expected ASCOR products/output
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- Detailed DEM and orthophoto mosaics of the Ogosta Valley
- Detailed map of As soil contamination
- Hot spots of groundwater pollution outlined
- Flooding maps
- River and groundwater monitoring system
- Better knowledge on As release factors
Expected ASCOR products/output

As bioaccessibility
(Nina Mahler, MSc)

As plant uptake and speciation
(Petar Mandaliev, postdoc)

As mobility in soils
(Elisabeth Papazoglou, MSc)

As speciation and distribution
(Petar Mandaliev, postdoc)

Short-term variations in Ogosta water chemistry
(Martin Mosimann, BSc)

Influence on Mn on reductive As mobilization
(Katrin Ehlert, PhD)

Magnetic susceptibility of Ogosta soils
(Stephanie Schnydrig, BSc)

Microbial communities
(Michael Simmler, PhD)
Identification of stakeholders and their water related needs

- Local authorities: Municipalities of Chiprovtsi, Georgi Damyanovo and Montana
  - Tourism development and environmental protection
  - Water supply, sewerage system, waste water treatment
  - Making and maintenance of cadastres
Local business

- Tourist operators
  - Interested in clean environment and river water

Guest house Torlatsite, Chiprovtsi

Ogosta River
Local business

- Sheep and cattle breeding farms in Chiprovtsi, G.Tserovene v., etc.
  - clean water
  - clean floodplain
Local business

- Farmers in the Ogosta Valley
  - clean floodplain
  - protection against floods
Local business

- ECOTERRA – biofarming in the Ogosta valley
  - clean groundwater for irrigation
  - groundwater drainage
  - protection against floods
Local business

- Small water power plants
- River discharge
Local NGOs

- Local action group – Zapadna Stara planina – Kopren – Midzhur
  - Development of local economy
  - Environmental protection
  - Rising the awareness of the environmental problems
Local people

- Interested in:
Local people

- Interested in:
  - Better quality of drinking water
Local people

- Interested in:
  - Better quality of drinking water
  - Irrigation of the vegetable gardens
  - Protection against floods and river bank erosion
  - Fishing
  - Swimming in the river
  - Preservation of the riverine environment
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Local people

- Interested in:
Institutions

- River Basin Directorate – Danube district
  - Information on river and groundwater quality
  - Information on point and diffuse sources of pollution
Institutions

- National Institute of Hydrology and Meteorology
  - Revealing river - groundwater interaction
  - Automation of river monitoring
Interaction with stakeholders

- Chiprovtsi town hall meeting, April 9, 2013 - Presentation of ASCOR project to the local authorities, governmental agencies and NGOs
- Field demonstration for pupils from Chiprovtsi, May, 2013
Interaction with stakeholders

- Provision of plots for construction of monitoring wells by the local authorities
- Involvement of local people and business in the project activities
### ASCOR output versus stakeholders’ needs

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Benefits of ASCOR for the local community

- Raised awareness of the local environmental problems at local and national level
- More adequate decision-making on water management and land use
- Better prospects for dealing with the As contamination in the Ogosta Valley
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Can be ASCOR harmful for the local tourism development?
Thanks for your attention
Interaction with stakeholders

- Presentation of the ASCOR project
- Field trip with pupils from Chiprovtsi
- Contract for cooperation with the municipality of Chiprovtsi
- Provision of plots for construction of monitoring wells by the local authorities
- Sent information on monitoring wells to the River Basin Directorate
- Involvement of local people and business in the project activities
- Contacts with the manager of a small WPP
- Talks with local people in the field explaining the risks of arsenic pollution
- Contacts with the local hydrologist of NIMH, a map of the GW monitoring system sent to NIMH