IHP-V Theme 2
Ecohydrological processes in the surficial environment

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Theme content

1. Vegetation, land-water use and erosion processes
2. Sedimentation processes in reservoirs and deltas
3. Interactions between river systems, flood plains and wetlands
4. Comprehensive assessment of surficial ecohydrological processes

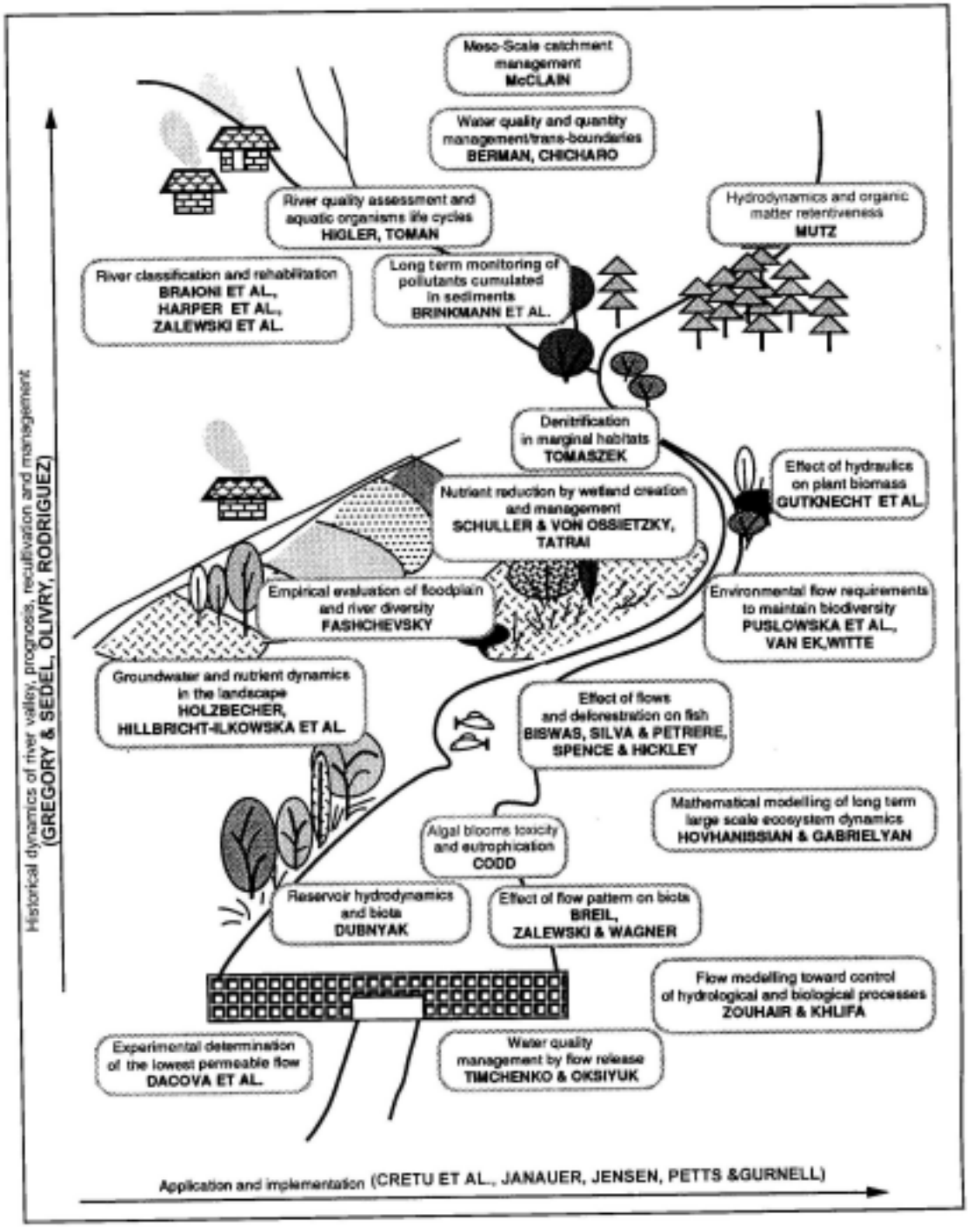
Importance of theme

- Increasing recognition of interaction between hydrology and biota in catchments
- Water management goals framed as “ecological quality”
- Recognition that hydrotechnical solutions not sustainable



Structure of theme

- Process-based projects addressing different topics within ecohydrology
- Interaction between scientific research and application



Conferences and workshops organised

- “International symposium on erosion and sedimentation” UK 1996
- Advanced Study Course in Ecohydrology for young scientists, Central Europe 1999
- “Science and the sustainable management of tropical waters” Conference, Kenya 1999
- “Hydrological and geochemical processes in large scale river basins” International Symposium, Brazil 1999
- “Asia Pacific workshop on ecohydrology”, Indonesia 2001

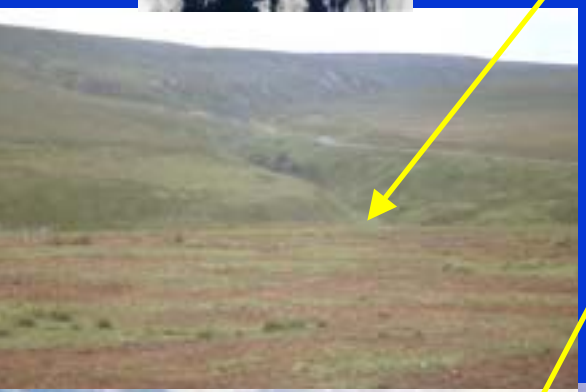
Achievements of Theme 2

- Diversity of projects and wide participation
- Involvement of young scientists
- Interaction between scientific research, application and education
- Improved dialogue between ecologists and hydrologists
- Awareness of decision-makers raised

Difficulties encountered

- Ambitious aims
- Progress on processes slow
- Conflict between basic and applied research: solutions demanded now, but still a lot to learn
- Integrating the outcomes of the large number of projects

Scales of ecohydrology



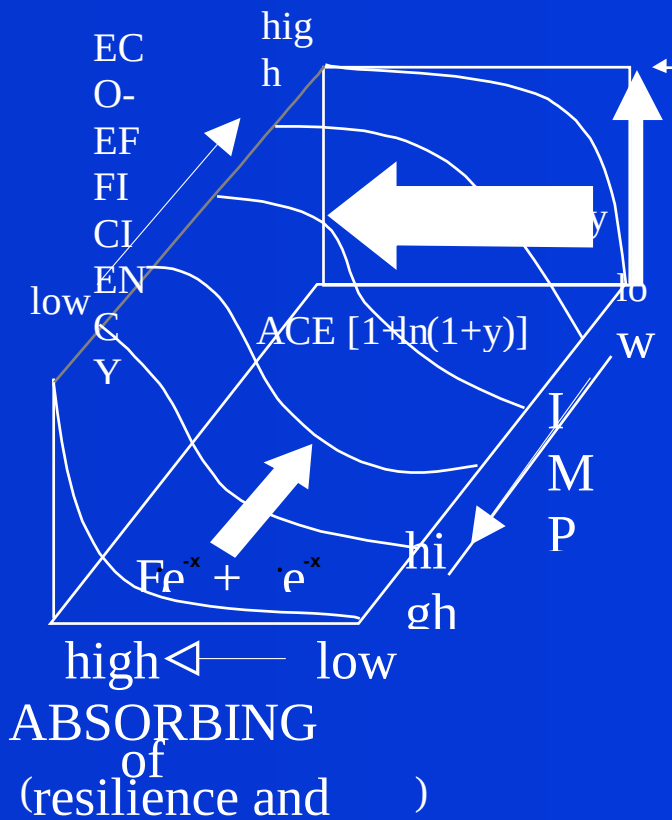
- Global: effects of climate on biota
- Catchment: characteristics of land surface affect energy and momentum fluxes, biogeochemical cycling
- Riparian zone: filtering and trapping of nutrients, sediment and pollutants
- Reservoir/lake: sedimentation, retention and conversion of nutrients

Ecohydrology principles

1. Water and biota ≈ superorganism at the catchment scale
2. Enhancing the absorbing capacity of catchment ecosystems against human impact requires understanding of the resistance and resilience of the superorganism
3. Ecosystem properties should be used as a management tool

Ecohydrology and sustainable water resources

Useful framework to communicate the essential role of ecohydrology to hydrologists and decision-makers



SUSTAINABLE WATER RESOURCES

$SWR = F_{e^{-x}} + \cdot e^{-x} + ACE \ln(1+y)]$

Reduction of impact Enhancement of ecosystem
ECO-EFFICIENCY ABSORBING CAPACITY
(EH principle)

TheEcohydrology principle as component of the equation of sustainability water resources(SWR) in the face of global change.

ACE - increase of ecosystem absorbing capacity against human impact

E - reduction of energy use(global climate)

M - reduction of material use (pollution)

Key ecohydrology questions

- Quantification of hydrological and biological processes
- Understanding the timing of nutrient, organic matter and organism fluxes between terrestrial, freshwater and floodplain systems
- Regulation of life strategies, lifecycles and intraspecific interactions of freshwater organisms
- The consequences of these for water quality

Contribution of ecohydrology to IHP-VI

- “Ecohydrology” has disappeared but ecohydrologists are required to contribute to all themes
- Theme 1: Global changes and water resources
  - 1.1 Global distribution of resources: water supply and water quality: biophysical datasets, ecosystems
  - 1.3 Integrated assessment of water resources in the context of global land-based activities and climate change: natural habitat availability, biophysical models, ecohydrological changes

Contribution of ecohydrology to IHP-VI

- Theme 2 Integrated watershed and aquifer dynamics
  - 2.1 Extreme events in land and water resources management: ecological vulnerability
  - 2.4 Methodologies for integrated river basin management: environmental emergency situations, biotic response prediction, biota as indicators of progress in integrated river basin management
- Theme 3 Land habitat hydrology
  - Ecohydrology requirement permeates theme
  - Try to avoid losing sight of general ecohydrology principles

Contribution of ecohydrology to IHP-VI

- Theme 4 Water and society
  - Little mention of ecohydrology
  - Suggest greater involvement of ecohydrologists as society very sensitive to “ecological quality” of water bodies
- Theme 5 Water education and training
  - Suggest inclusion of ecohydrological training

Ecohydrology: where do we go from here?

- Continue quest for integrated framework
- Continue the work of IHP-V Theme 2 to improve communication between ecologists and hydrologists, especially young scientists
- Ecology and hydrology include applied and basic scientific research. Both should be encouraged.