

Project „Cultural landscapes of mountain and highland river valleys”
supported by a grant from Norway
through the Norwegian Financial Mechanism
in the framework of Polish-Norwegian Research Fund



CAUSES OF CHANNEL STRUCTURE CHANGES IN THE RIVERS OF CARPATHIAN MTS.

Elżbieta Gorczyca, Kazimierz Krzemień
Institute of Geography and Spatial Management

Jagiellonian University

e.gorczyca@geo.uj.edu.pl

k.krzemien@geo.uj.edu.pl



Seminar in Bergen 12-16.09.2009

Supported by a grant from Norway through
the Norwegian Financial Mechanism



UNIVERSITY OF AGRICULTURE
IN KRAKOW



Project „Cultural landscapes of mountain and highland river valleys”
supported by a grant from Norway
through the Norwegian Financial Mechanism
in the framework of Polish-Norwegian Research Fund



THE REASONS FOR MORPHOLOGICAL CHANGE TO CARPATHIAN RIVER CHANNELS

Natural:

Climate change (long-term)

Extreme meteorological events

Tectonic movements

Antropogenic:

In basins

Land use change; and specifically

Basin development

(roads, other paved areas and buildings)

In valley bottoms and river channels

River training

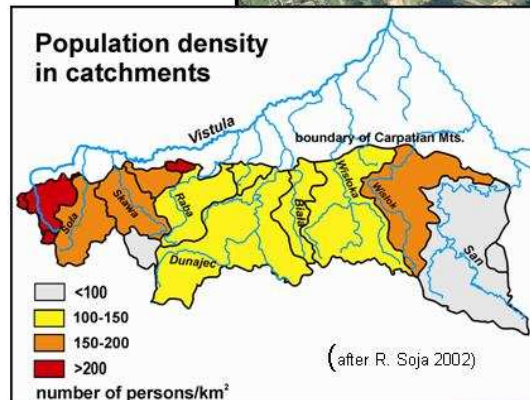
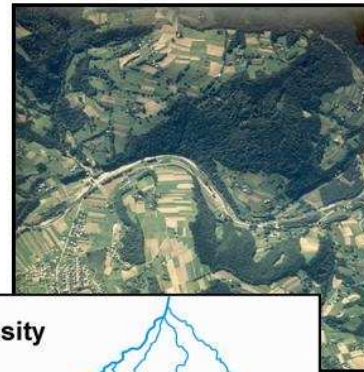
bank reinforcement

and new training sequences

Extraction of channel gravel

- individual cobbles mass extraction

Erection of river embankments



UNIVERSITY OF AGRICULTURE
IN KRAKOW



EFFECTS AND EXTENT OF LANDFORM CHANGE IN RIVER CHANNELS

EFFECTS

Long-term morphology change to river channels (long-term climatic change, tectonic movements and land-use change)

Rapid morphology changes (extreme precipitation events, training of entire channel systems, basin development, land-use changes, gravel extraction)

EXTENT

LOCAL (*channel reaches*)

- Deepening
- Narrowing
- Straightening
- Long profile modifications (knick-points creation)
- Changes to morphodynamic functions

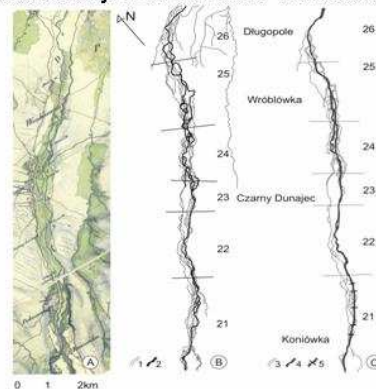


UNIVERSITY OF AGRICULTURE
IN KRAKOW

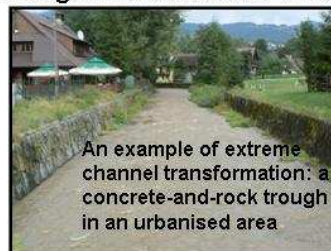
Project „Cultural landscapes of mountain and highland river valleys”
supported by a grant from Norway
through the Norwegian Financial Mechanism
in the framework of Polish-Norwegian Research Fund



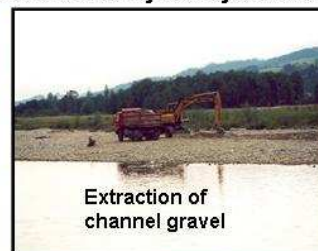
XIX century middle of XX c. end of XX c.



Changes in the course channel of the Czarny Dunajec River



An example of extreme channel transformation: a concrete-and-rock trough in an urbanised area



Extraction of channel gravel



PROTECT

Seminatural and even natural braided river channel – worthy to protect them are still present in the Carpathians.

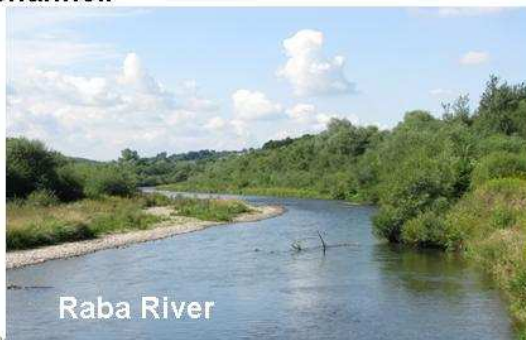
This is especially a channel of Białka river.

Few other rivers – among others – Czarny Dunajec, Wisłoka, Wisłok, Raba have reaches with braided channel.

Project „Cultural landscapes of mountain and highland river valleys”
supported by a grant from Norway
through the Norwegian Financial Mechanism
in the framework of Polish-Norwegian Research Fund



Białka River



Raba River



Raba River



UNIVERSITY OF AGRICULTURE
IN KRAKOW



HOW TO PROTECT?

- Reserves, national parks, protective zones, riverbank parks
- Waste-water treatment plants
- Litter control, fines
- Education (find existing solutions and/or develop own).

WHAT ARE THE POSITIVES IN CARPATHIAN COMMUNITIES?

- Blocking roads leading to the river banks, obstacles to wildcat waste-tipping and gravel and cobbles extraction
- People and authorities turn to rivers for opportunities: controlled tourism and recreation
- Education: interpretation signs provide information about the uniqueness of places, educational paths along rivers.

Project „Cultural landscapes of mountain and highland river valleys” supported by a grant from Norway through the Norwegian Financial Mechanism in the framework of Polish-Norwegian Research Fund

norway grants



UNIVERSITY OF AGRICULTURE
IN KRAKOW

UNI F O B
UNIVERSITÄTSFORSKNING BERGEN

Project „Cultural landscapes of mountain and highland river valleys” supported by a grant from Norway through the Norwegian Financial Mechanism in the framework of Polish-Norwegian Research Fund

norway grants

SUMMARY

Changes to river courses are observed in entire channel systems. Main changes are:

- narrowing of entire channel systems,
- deepening of entire channel systems.

These changes were result of:

- land-use changes and infrastructure development in the basins,
- direct influence of human pressure on the channel.

Human intervention in the channel (training) should be restricted only to sites strategic for the local infrastructure (buildings, roads, bridges).

What can we do:

natural parks and reserves, effective ban on wildcat landfilling, educational paths, turning the local population and authorities towards viewing rivers as a common good.



UNIVERSITY OF AGRICULTURE
IN KRAKOW

UNI F O B
UNIVERSITÄTSFORSKNING BERGEN