APPENDIX A - LIST OF MAIN DIGITAL DATA SOURCES

Metadata sources:

1) Ministry of Agriculture (agriculture related information in Slovak):

http://www.mpsr.sk/slovak/mis/index.php

2) Slovak Environmental Agency (environment related information in English):

http://www.sazp.sk/english/tematika/stav/ed11/index.html

GIS data sources:

A.1 Institute of Geodesy, Cartography and Land Registry (GKI)
http://www.gku.sk

A.2 Slovak Water Management Enterprise – Branch Office Danube River Basin (SWME-DRB)
http://pdpr.pod.sk

A.3 Slovak Water Management Enterprise – Branch Office Irrigation and Drainage (SWME-ID)
http://www.vumki.sk

A.4 Slovak Hydro-Meteorological Institute (SHMI)
http://www.shmu.sk

A.5 Soil Science and Conservation Research Institute (SSCRI)
http://www.vupu.sk

A.6 Geological Survey of Slovak Republic (GSSR)
http://www.gssr.sk

A.7 Slovak Environmental Agency (SEA)
http://www.sazp.sk

A.8 Forest Management Institute (FMI)
http://www.lesoprojekt.sk

A.9 other state and private organisations

A.1 GIS database of GKI

GKI is responsible for geodetic databases, information systems of geodesy, cartography and cadasters, state mapping, the databases of geographic information systems, related documentation and archiving tasks. The institute maintains databases of geodesy, cartography, photogrammetry, GIS and cadasters. It is the primary source of topographic information from scale 1:10 000 to smaller scales. Land parcel data available at larger scales from the land registry database.

Topographic maps:

Scale 1:50 000 topographic maps are available in both digital vector (SVM50) and digital raster image (ZM50) formats. SVM50 includes the layers of: administrative boundaries, settlements and isolated buildings, road network, railways, surface water network, land cover, elevation map, and annotations. Each layer contains sub-layers with the common groups used in topographic maps.

The raster image maps were prepared by scanning the layers of different colours of topographic maps. The topographic map data were split into layers based on colours used in cartography. Thus, the separate image files are available for point and linear object (black colour), elevation contours (brawn colour), annotations (black colour), river network (blue colour), and vegetation (green colour). These basic layers are available for 1:10 000 (ZM10), 1:25 000 (ZM25) and 1:50 000 (ZM50) scale maps. In addition, the administrative boundaries layer (red) was prepared for the 1:50 000 scale maps.

The colour composite maps at the scale 1:50 000 (DRM50) are available as a single digital raster image, as well. 1:10 000 scale maps are available only in digital raster image form (ZM10) and representative for 1990.

Map of administrative divisions:

The digital vector map of administrative structure of Slovakia is available in scale 1:10 000 (MSR10). It contains the information of cadaster boundaries, name and codes of cadasters (UTJ - uzemno technicka jednotka), villages and towns (ZUJ - zakladna uzemna jednotka), districts and regions. Data include information on the administrative structure before the introduction of administrative reform in 1996, as well.

Land registry:

In recent years the digitisation of basic land parcel/ plot maps has been started. These maps will be utilised not only for land register purposes but also for other state administration reasons, e.g. in case of agricultural lands the documentation of subsidies for crop productions, etc. Maps covering about 70 % of the study area have been already made in digital form.

A.2 GIS database of SWME-PD

Branch Office Danube River Basin (Povodie Dunaja - PD) is one among 5 Branch offices of the Slovak Water Management Enterprise (SWME). It is responsible for the management and protection of waters (rivers, lakes, reservoirs, etc.), as well as the maintenance and operation of water management facilities (gates, canals, pumping stations, etc.) within its authority of Morava and Danube basins.

To ensure its high quality work, a geographic information system is being developed. Although the development of an Integrated Geographical Information System of SWME is organised by the head office in Banska Stiavnica, each branch office is responsible to develop the system within its territory.

In recent years, the digital Water Management Maps were prepared for the entire Slovak Republic at the scale of 1:50 000. The maps cover the country by river basins. SWME-PD further developed the database within its area with the application scale of 1:10 000. The database has 4 main groups of data containing the following sets of data:

VODA	**UMEPRV**	**BIOTA**	**GEOATM**
River Network (Toky)	Connections (Spojenie)	Land Cover (Rastlinny Kryt)	Hypsography (Vyskopis)
Water Bodies (Vodne Plochy)	Objects (Objekty)	Animals (Zivocichy)	Hydrogeology (Hydrogeologia)
Hydraulic Constructions (Hydrotechnika)	Geodetic Points (Geodeticke Body a Merania)	Protected Areas (Chranene Uzemie)	Orography (Orografia)

Flood Protection (Povodnova Ochrana)	Engineering Networks (Inzinierske Siete)		Relief (Relief)
Irrigation and Drainage (Melioracie)	Transportation Network (Kommunikacie)		Carstic formations (Krasove Javy)
Water Quality and Pollution Sources (Kvalita a Zdroje Znecistenia)	Settlements (Sidla)		Pedology (Pedologia)
Navigation (Vodna Doprava)	Administrative Structure (Hranice)		Erosion (Erozia)
Water Sources and Groundwater (Vodne Zdroje a Podzemna Voda)	Maps (Mapy)		Prevailing Winds (Prevladajuce Vetry)
Basins (Povodia)			AverageRainfall (Priemerne Zrazky)

The GIS database is developed under Intergraph environment (Microstation, MGE). Each dataset is stored in a separate design (vector data) file and linked to external databases. Neither the graphical components nor the databases are completed yet. The graphical layers of data sets in the groups of VODA and UMEPRV are already completed. Data sets of BIOTA and GEOATM are partially completed. Information on the development level of external databases has not been available for the Study.

A.3 GIS database of SWME-ID

In 2001 the Research Institute of Irrigation and Drainage became the fifth branch office of the Slovak Water Management Enterprise. The restructuring took place to form a management body responsible for the management, maintenance and operation of irrigation and drainage systems and facilities. This field of water management is not divided further into river basins, the Branch Office of Irrigation and Drainage has authority for whole Slovakia.

The establishment of the Branch Office is in transition as well as its GIS database development. Earlier specific departments of River Basin Authorities were in charge of irrigation and drainage issues hence data and information on systems are stored in their archives. Nowadays, the most emerging task is to collect and transfer all relevant materials to the GIS department of SWME Branch Office of Irrigation and Drainage (SWME-ID).

SWME-ID already established the databases of irrigation and drainage areas. The thematic layers accompanied by the scanned image files of detailed design maps of irrigation and drainage projects. The maps of Documents of irrigation and drainage development projects were collected and the design maps were scanned and geo-referenced. Unfortunately, not all project documents are available at this time. The scanned images will serve as a basis to digitise the detailed layouts of each irrigation and drainage system (such as pipelines, hydrants, pumping stations, etc.).

In addition to map information the digital database of irrigation and drainage facilities is readily available. Without any direct geographic reference, the database provides detailed information on the facilities. The database is formed by two data sets: 1) data of irrigation and drainage systems (projects), 2) data of each objects (objects of projects), such as canal, pumping station, area extent, etc. within a specific system. Unfortunately, the last update of the central database was in 1992.

One of the development targets of the GIS database is to link the database to the vectorised map elements, meanwhile updating data and information about the present status of drainage and irrigation systems.

A.4 GIS database of SHMI

The Slovak Hydro-Meteorological Institute (SHMI) is in charge of operating and maintaining the state monitoring networks of meteorology and climatology including air quality and air pollution sources, surface and groundwater hydrology including water quality as well. Regarding to the monitoring activities that is to record, process, distribute and archive the observation data SHMI established digital databases. Databases store the time series data of parameters observed at geographically referenced locations. Using point observation data, and nowadays more often simulation models as well, thematic maps are prepared for visualising certain phenomena, such as rainfall distribution, air pollution distribution, etc. Thematic maps are prepared to calculate water balances for basins, to map protection zones of water resources, etc.

The geographic information system of SHMI is under development. Department of meteorology and climatology has long experience of mapping measured and estimated climatic characteristics. In the field of hydrology and water

management GIS development works had started later. Digital maps are generated only casually and mainly for presentation purposes. However, in the field of water protection SHMI has just become the responsible organisation to coordinate the preparation of the Hydro-Ecological Plans (HEP). The plans, similar to Water Management Plans, accompanied by 1:50 000 scale thematic maps. Hydro-Ecological Maps are already available in digital cartographic form but unfortunately these maps are not yet ready for GIS usage. In 2001 the actualisation of the maps was started for the Morava and Bodrog river basins and one of the objectives is to establish the GIS database of Hydro-Ecological Maps.

A.5 GIS database of SSCRI

Soil Information System is based on observed information of both field surveys and regular monitoring activities (sampling and analysis). The system includes both raw observation data and derived data that are generated by analysis, evaluation and/ or modelling. The soil monitoring system is co-ordinated by the Soil Science and Conservation research institute that is primarily responsible for agricultural soil monitoring. Other participating organisations are the Forest Research Institute being in charge of monitoring of forest and alpine soils, and the Central Controlling and Testing Institute in Agriculture.

Based on the processing of monitoring data and field surveys, thematic maps are prepared. The whole territory of Slovakia was surveyed and mapped at different levels of interest. SSCRI recognised early the advantages of digital mapping thus they have already established a GIS database that includes not only basic information on soils but also evaluation maps about factors affecting agricultural soils (e.g. water erosion risk or wind erosion risk).

The digital maps contain information at various scales for various geographical areas. The Soil Map and Soil Texture Model of Slovakia (1:400 000), Bonity Map of Slovakia Farming Land (1:500 000), Map of Potential Water and Wind Erosion on Slovakian Farming Land (1:500 000), Agricultural Soil Productivity in Slovakia (1:500 000) have national coverage. Soil maps at scale 1:50 000 are available for regions of Zitny Ostrov, Mala Fatra, Zilinska Kotlina, Ziarska Kotlina, Kosicka Kotlina, Slanske Vrchy and Galánta.

The basic GIS database for agriculture is the Soil Bonitation Information System. It was constructed by the integration of Bonitation Data Bank (BDB) that

includes bonitation background data of soil resources (morphological units, subtypes, textural categories, humus, carbonates, pH, P, etc.) and the mapped Pedo-Ecological Units (PEU) that represent pedologically and ecologically homogenous fields. The integration of database and mapping units resulted in the formation of the Bonited Pedo-Ecological Units (BPEU) GIS database, as well as the update of BDB. The BDB is an important element of both the agricultural subsidiary system and taxation of agricultural soil use, as well as it constitutes the basis for assessment of production potential, plant nutrition, melioration measures, etc.

The most recent country-wide field survey is the Soil Geochemical Mapping in Slovakia. The survey was carried out between 1991 and 1995. The obtained data is representative at the scale of 1:1 000 000 for the country and at the scale of 1:50 000 for hot spot areas. In the project, agricultural and forest soils were sampled for A and C horizons based on a 10 km^2 grid network (1 sample / 10 km^2). Samples were analysed for both chemical (36 kinds of chemical elements) and soil characteristics. Data provide information on soil degradation and soil quality, as well as on soil pollution. Although the work was carried out by SSCRI for agricultural soils, the database is available from the Geological Survey of SR, the organisation having been the main co-ordinator of Geochemical Mapping project (Geochemical Atlas).

A.6 GIS database of GSSR

The Geological Survey of Slovak Republic is responsible for geological research and exploration, the development of information systems in geology, that include the recording, registering, distribution and archiving of geological works. The Institute prepares maps and professional geological publications. The preparation of digital geological and hydro-geological maps, tectonics maps at the scale of 1:50 000 was started a few years ago. The maps completed by this year cover only a small part of Slovakia. The Hron river basin was completed in 1999 in co-operation with the JICA Hron river basin project. Digital geological map for Malacky okres is also available.

The digitisation of the borehole database that contains information on the characteristics of hydro-geological boreholes, such as geological profile,

pumping test information, estimated and registered hydraulic parameters, screen and chemical analysis is not yet completed either.

GSSR co-ordinated the Geochemical Atlas project that took place between 1991 and 1995. The objective of the project was to determine the distribution of chemical elements in the main environmental components: Soils, Ground waters, Stream Sediments, Rocks, Forest Biomass and to characterise Natural Radioactivity at the territory of Slovakia. During the project, samples were collected and analysed. Sampling densities ranged from 3 to 10 km^2 / samples from regional scale to national, respectively. The results of analysis were evaluated and digital mapping for chemicals in each environmental component was done for whole Slovakia. The project ended by the publishing of its results in the Geochemical Atlas series (volume I – VI). The digital databases are available through Geofond (archiving department of GSSR).

A.7 GIS database of SEA

The Slovak Environmental Agency (SEA) was established for the improvement and protection of the environment. It performs broad variety of activities in the fields of regional development, nature and landscape protection, waste management, informatics, environmental risk assessment and management, environmental evaluation and labelling of products, environmental education and promotion, etc.

The Department of Environmental Information is the GIS development centre of the Agency. Its main activities include:

- the development of the Environmental Information System (ISZP) including its subsystems of Monitoring Information System (ISM) and Land Information System (ISU) for decision making support and the provision of information on the environment,
- the development of Information System of District Environmental Departments (ISOZP) that includes the development of office and GIS applications for individual branches working within each District Environmental Department,
- the development of the Metadata IS of the ISZP.

As the main co-ordinator of ISZP and the developer of its integrated database (clearing house) the Agency has three main sources of data:

- data already processed by other organisation: Pedology, Tree Species Composition, Forest Health Conditions, Forest Management Units, etc.
- data collected and processed by SEA: Protected Nature Areas, Protected Trees, Springs and Mineral Waters, CORINE Land Cover, Digital Elevation Model, Waste Catalogue, etc.
- data collected by other organisation but digitally processed by SEA: Administration Units, Watersheds, Water Protection Zones, etc.

A.8 GIS database of FMI

FMI is the state organisation responsible for forest management at national level. It supports and operates the branch of the state information system with the tasks of:

- co-ordinating the accomplishment of the project,
- providing consulting and education services,
- collecting, processing, archiving, updating and distributing information about forests in SR.

It provides geodetic, cartographic and printing services as well as publishing and archiving of the thematic state maps of forest management.

FMI has already developed its GIS database system to fulfil these tasks in high quality. Digital maps of forest stands (the smallest forest management units) have been just completed at the scale from 1:5 000 to 1:10 000. The plot and field boundaries are also being digitised from cadaster maps to complete the integration of map information to database. The digital database contains information not only on the natural factors of each forest stand, but also information on the owner, users and other legal, and economical conditions. By the details and geographic accuracy of information on forests the GIS database is much more advanced than that for agricultural lands.

APPENDIX B- LIST OF DIGITAL DATA OBTAINED BY THE STUDY

B.1 Topography

Table B.1.1 Basic Map of Slovakia – ZM10

Data set	Topographic map - ZM10	**Ref. No.**	RO-GKU-01
Contact person	Mr. S. Spacek	**Source**	GKU
Origin	scanned topographic map layers	**Format**	2 colour image (tiff)
Spatial coverage	whole Slovakia	**Scale**	1:10 000
Temporal coverage	representative for 1990	**Projection**	Slovak Civil (JTSK)
Obtained coverage	Study Area	**Topology**	raster
Attributes/ Main items	- lines, markers (polohopis) - elevation contorus (vyskopis) - annotations (popis) - river network (vodstvo) - vegetation (porastove plochy)		
Processing	For GIS application vectorization might be required		
Usage	Basic data, supporting background map		
Path in GIS database	due to the size it was handed over to the counterpart on a separate CD-ROM		

Table B.1.2 Digital elevation contours

Data set	Elevation data	**Ref. No.**	PR-ST-01
Contact person	Mr. M. Jenco (SWME-ID)	**Source**	JICA Study Team
Origin	RO-IGC-01 elevation contours vectorized by the Study Team	**Format**	Vector(AV Shape)
Spatial coverage	Study Area	**Scale**	1:10 000
Temporal coverage	Not relevant	**Projection**	Slovak Civil (JTSK)
Obtained coverage	Study Area	**Topology**	Line, point
Attributes/ Main items	- elevation values of contour lines, points (meters above see level)		
Processing	automatic vectorization of raster maps, manual attribute data input		
Usage	Basic elevation vector map, supporting map, input of digital elevation model		
Path in GIS database	due to the size it was handed over to the counterpart on a separate CD-ROM		

Table B.1.3 Digital Elevation Model

Data set	Raster digital model of relief	**Ref. No.**	PR-ST-02
Contact person	Mr. M. Jenco (SWME-ID)	**Source**	JICA Study Team
Origin	Prepared by JICA Study Team	**Format**	image (AV grid)
Spatial coverage	Study Area	**Scale**	1: 10 000
Temporal coverage	none	**Projection**	Slovak Civil (JTSK)
Obtained coverage	Study Area	**Topology**	raster (10 m x 10 m)
Attributes/ Main items	- digital elevation model - slope, aspect, curvature - (vector elevation contour lines)		
Processing	Pre-processing to derive the necessary parameters, automatic processing using GRASS GIS built in functions		
Usage	Erosion assessment, soil grouping, land evaluation, etc.		
Path in GIS database	due to the size it was handed over to the counterpart on a separate CD-ROM		

Table B.1.4 SPOT Satellite images

Data set	Satellite images	**Ref. No.**	RO-ST-01
Contact person	Mr. M. Jenco (SWME-ID)	**Source**	JICA Study Team
Origin	SPOT Xi (multispectral) and SPOT PANchromatic raw images purchased from GISAT Co. Prague	**Format**	Vector(AV Shape)
Spatial coverage	Study Area	**Scale**	1:10 000
Temporal coverage	1999-05-10 (SPOT Xi); 2000-08-20 (SPOT PAN)	**Projection**	Slovak Civil (JTSK)
Obtained coverage	Study Area	**Topology**	Line, point
Attributes/ Main items	- elevation values of contour lines, points (meters above see level)		
Processing	Before GIS applications orthorectification was required. Orthorectification was carried out by data provider GISAT Co. During the process 28 ground control points (GCPs) were used and a 25 metres grid resolution digital elevation model was applied.		
Usage	Base of photo-interpretation for land cover classification		
Path in GIS database	due to the size it was handed over to the counterpart on a separate CD-ROM		

B.2 Climate, meteorology, hydrology

Table B.2.1 Hydrological and Meteorological observation network data

Data set	Hydrological and meteorological observation network	**Ref. No.**	RO-SHMU-01
Contact person	Dr. P. Stastny (meteo), Mr. R. Chriastel (gw), Mr. L. Luptak (sw)	**Source**	SHMU
Origin	Monitoring network by Slovak Hydro-Meteorological Institute	**Format**	tabular (Excel)
Spatial coverage	whole Slovakia	**Scale**	1:50 000
Temporal coverage	not relevant	**Projection**	Slovak Civil (JTSK)
Obtained coverage	Morava River Basin	**Topology**	point
Attributes/ Main items	- meteorological and precipitation stations (locations, name) - ground water observation wells (locations, code) - surface water gauging stations (locations, code)		
Processing	spatial interpolation, point to izoline generation		
Usage	Water management planning, irrigation ad drainage management		
Path in GIS database	jica_GISdata:/zahorska/raw_data/meteorology/gw_monitor_sites.dxf, sw_monitor_sites.dxf, prec_stn.dbf, prec_clima_stn.dbf, hydro_stn.dbf		

B.3 Soils

Table B.3.1 Soil Monitoring Database

Data set	Soil Monitoring Database	**Ref. No.**	RO-SSCRI-01
Contact person	Dr. B. Ilavska	**Source**	SSCRI
Origin	monitoring network data	**Format**	tabular (Excel)
Spatial coverage	agricultural soils of Slovakia	**Scale**	none
Temporal coverage	regularly updated	**Projection**	Slovak Civil (JTSK)
Obtained coverage	Study Area, year of geochemical atlas project	**Topology**	point
Attributes/ Main items	- soil organic matter content		
Processing	X, Y, attribute conversion to shape		
Usage	soil fertility assessment, fertilization plans, crop pattern plans		
Path in GIS database	jica_GISdata:/zahorska/raw_data/soils/kpp_vuzh.dbf		

Table B.3.2 Bonited pedo-ecological unit (BPEU) map

Data set	Bonited pedo-ecological unit (BPEU) map	**Ref. No.**	RO-SSCRI-02
Contact person	Dr. B. Ilavska	**Source**	SSCRI
Origin	integration of Bonitation Data Bank and Pedo-Ecological Unit maps	**Format**	vector (AV shape)
Spatial coverage	agricultural soils of Slovakia	**Scale**	1:5 000
Temporal coverage	None	**Projection**	Slovak Civil (JTSK)
Obtained coverage	Study Area	**Topology**	polygon
Attributes/ Main items	- bonited pedo-ecological unit codes (BPEJ5) - climatic regions (klimaticky regiónov) - soil types (podnych typov) - skeleton content and depth (skeletovitost' a hibky pody) - soil texture (podnych druhov) - soil production potential catagories (typologicka produkena kategoria)		
Processing	None		
Usage	soil and land evaluation, planning of soil and agricultural management, subsidy allocation		
Path in GIS database	jica_GISdata:/zahorska/raw_data/soils/zahorie.exe		

Table B.3.3 Geochemical Atlas of Slovakia: Soils

Data set	Geochemical Atlas of Slovakia: Soils	**Ref. No.**	RO-SSCRI-03
Contact person	Dr. L. Caudt	**Source**	Geofond
Origin	Geochemical Atlas project	**Format**	tabular (dBASE)
Spatial coverage	whole Slovakia	**Scale**	1:1 000 000
Temporal coverage	reference years 1991-1995	**Projection**	Slovak Civil (JTSK)
Obtained coverage	Study Area	**Topology**	point
Attributes/ Main items	- sampling point locations - total chemical element content of 36 elements from A and C horizons - soil texture data		
Processing	table (X, Y, attribute) conversion to point shape		
Usage	soil pollution analysis, soil fertility assessment,		
Path in GIS database	jica_GISdata:/zahorska/raw_data/soils/a_horn_clip, c_horn_clip		

B.4 Waters

Table B.4.1 Map of River Network (Water Management Map)

Data set	River Network (Toky)	**Ref. No.**	RO-SWMEPD-01
Contact person	Mr. B. Kovac	**Source**	Povodie Dunaja
Origin	digitised from paper water management maps	**Format**	vector (MGE dgn)
Spatial coverage	Danube and Morava River Basins	**Scale**	1:10 000
Temporal coverage	none	**Projection**	Slovak Civil (JTSK)
Obtained coverage	Morava River Basin	**Topology**	line, point
Attributes/ Main items	- 1^{st} – 4^{th} order streams, ephemeral stream, subterranean stream, covered stream - canals, oxbow lakes, - river training, protecting dike, natural bank, embankment, bank fortification - water level/line, operating level, flooding line/ reservoir boarder line - profile, measurement - dike hkm, river chainage, dike chainage, alternative km, km table)		
Processing	None		
Usage	Water resources management, flood control, irrigation and drainage planning		
Path in GIS database	jica_GISdata:/zahorska/raw_data/waters/tokmor.dgn, tokmy.dgn		

Table B.4.2 Map of Water Areas (Water Management Map)

Data set	Water areas (vodne plochy)	**Ref. No.**	RO-SWMEPD-02
Contact person	Mr. B. Kovac	**Source**	Povodie Dunaja
Origin	digitised from paper water management maps	**Format**	vector (MGE dgn)
Spatial coverage	Danube and Morava River Basins	**Scale**	1:10 000
Temporal coverage	none	**Projection**	Slovak Civil (JTSK)
Obtained coverage	Morava River Basin	**Topology**	line, point
Attributes/ Main items	- lake, reservoirs, local reservoir, impounding reservoir, pond, fishpond - polder - open mine - peat-bog, swamp - dam body, water level		
Processing	None		
Usage	Water resources management, water protection		
Path in GIS database	jica_GISdata:/zahorska/raw_data/waters/voplo1.dgn		

Table B.4.3 Map of Water Sources and Groundwater (Water Management Map)

Data set	Water resources and groundwater (Vodne zdroje a podzemna voda)	**Ref. No.**	RO-SWMEPD-03
Contact person	Povodie Dunaja	**Source**	SHMU
Origin	digitised from paper maps by Povodie Dunaja	**Format**	vector (MGE dgn)
Spatial coverage	Danube and Morava River Basins	**Scale**	1:50 000
Temporal coverage	none	**Projection**	Slovak Civil (JTSK)
Obtained coverage	Morava River Basin	**Topology**	line, point
Attributes/ Main items	- well, spring, water source - water resources protection zone (pho), protection zone (op) - groundwater (podzemna voda)		
Processing	None		
Usage	Water resources management, water supply and water protection planning		
Path in GIS database	jica_GISdata:/zahorska/raw_data/waters/zdroje_pho_uzemia.dgn		

Table B.4.4 Map of Water Management Basins

Data set	Basins (Povodia)	**Ref. No.**	RO-SHMU-02
Contact person	Povodie Dunaja	**Source**	SHMU
Origin	digitised from paper maps by Povodie Dunaja	**Format**	vector (MGE dgn)
Spatial coverage	Danube and Morava River Basins	**Scale**	1:10 000
Temporal coverage	none	**Projection**	Slovak Civil (JTSK)
Obtained coverage	Morava River Basin	**Topology**	line, point
Attributes/ Main items	- basins, sub-basins, macro-basins, micro-basins		
Processing	None		
Usage	Basin-wide planning, water management, water quality control		
Path in GIS database	jica_GISdata:/zahorska/raw_data/waters/povodia.dgn		

Table B.4.5 Map of Groundwater Balance Units

Data set	Map of Groundwater Balance Units	**Ref. No.**	PR-SHMU-01
Contact person	Mr. Mihalik	**Source**	SHMU
Origin	paper map by SHMU, digitised by Study Team	**Format**	vector (AV shape)
Spatial coverage	entire Morava basin, also available for Slovakia	**Scale**	1:50 000
Temporal coverage	not relevant	**Projection**	Slovak Civil (JTSK)
Obtained coverage	Morava River Basin	**Topology**	polygon
Attributes/ Main items	- groundwater balance units (identical to hydrogeological regions and sub-regions)		
Processing	paper maps were digitised by head-up digitising, further processing is not required		
Usage	irrigation and drainage planning/ analysis, Crop pattern planning		
Path in GIS database	jica_GISdata:/zahorska/raw_data/waters/gw_balance_unit.shp		

Table B.4.6 Hydro-ecological Map

Data set	Map Volumes of Hydro-ecological Plan	**Ref. No.**	RO-SHMU-03
Contact person		**Source**	SHMU
Origin	colour scanned images, geo-referencing by JICA Zahorska project	**Format**	colour image (tiff)
Spatial coverage	Slovakian river Basins	**Scale**	1:50 000
Temporal coverage	completed in 1997	**Projection**	Slovak Civil (JTSK)
Obtained coverage	Morava River Basin	**Topology**	raster
Attributes/ Main items	- map of area sensitivity (ecological limits): degree and parameters of sensitivity, water protection zones, - map of anthropogenic activities: intensity of anthropogenic influence (irrigation, fertiliser use, landfills, erosion, water abstraction, effluents, land uses) - map of conflicts of interests – degree of load		
Processing	None		
Usage	water quality control, land classification, environmental loads		
Path in GIS database	due to the size it was handed over to the counterpart on a separate CD-ROM		

B.5 Land Cover

Table B.5.1 CORINE Land Cover 1970

Data set	CLC70 - CORINE Land Cover 1970	**Ref. No.**	RO-GISAT-01
Contact person	Mr. T. Soukup	**Source**	GISAT Co.
Origin	Satellite imagery (Landsat MSS), EU Phare PTL/LC Program	**Format**	vector (AV shape)
Spatial coverage	whole Slovakia	**Scale**	1:100 000
Temporal coverage	representative for the end of 1970's	**Projection**	Slovak Civil (JTSK)
Obtained coverage	Study Area	**Topology**	vector
Attributes/ Main items	- Land Cover Categories – CORINE 2nd level (artificial surfaces, agricultural areas, forest and semi-natural areas, wetlands, water bodies		
Processing	None		
Usage	historical land cover data, land cover change analysis		
Path in GIS database	jica_GISdata:/zahorska/raw_data/landcover/zaho_clc70.shp		

Table B.5.2 CORINE Land Cover 1990

Data set	CLC90 - CORINE Land Cover 1990	**Ref. No.**	RO-SAZP-01
Contact person	Ms. N. Machkova	**Source**	SAZP RS Lab.
Origin	Satellite imagery (Landsat TM), land classification by EU Phare CORINE Program	**Format**	vector (AI coverage)
Spatial coverage	whole Slovakia	**Scale**	1:75 000
Temporal coverage	representative for early 1990's	**Projection**	Slovak Civil (JTSK)
Obtained coverage	Study Area	**Topology**	vector
Attributes/ Main items	- Land Cover Categories – CORINE 3rd level (linear objects 100 m, min. areas 25 ha)		
Processing	None		
Usage	land cover change analysis, data set should be used as historical land cover		
Path in GIS database	jica_GISdata:/zahorska/raw_data/landcover/CORJICA (ArcInfo coverage)		

Table B.5.3 CORINE Land Cover 2000

Data set	CLC2000 - CORINE Land Cover 2000	**Ref. No.**	PR-ST-03
Contact person	JICA Study Team	**Source**	Study Team / GeoModel
Origin	Satellite imagery (SPOT Xi, PAN), JICA Zahorska Study, interpretation by GeoModel Co.	**Format**	vector (AV shape)
Spatial coverage	Study Area	**Scale**	1:50 000
Temporal coverage	representative for 2000	**Projection**	Slovak Civil (JTSK)
Obtained coverage	Study Area	**Topology**	vector
Attributes/ Main items	- Land Cover Categories – enhanced CORINE 3rd level (linear objects 50 m, minimum areas 5 ha)		
Processing	None		
Usage	data set would represent actual land cover of the Study area; land cover change analysis; soil erosion assessment; reclassification of main land use classes		
Path in GIS database	jica_GISdata:/zahorska/raw_data/landcover/clc-ma-v8.shp		

B.6 Agriculture

B.7 Forests

Table B.7.1 Forest Management Database

Data set	Forest Management Database	**Ref. No.**	RO-LESO-01
Contact person	Dr. I. Herich / Mr. Z. Duben	**Source**	Lesoprojekt
Origin	forest registry database and forest maps	**Format**	vector (MGE dgn)
Spatial coverage	whole Slovakia	**Scale**	1:5 000
Temporal coverage	regularly updated	**Projection**	Slovak Civil (JTSK)
Obtained coverage	Study Area	**Topology**	polygon
Attributes/ Main items	- Forest Stands, - Forest Types, - Forest Categories and Sub-Categories, - Age Categories, - Forest Soil Types and Textures		
Processing	MGE to ArcView conversion		
Usage	erosion control (both water and wind erosion)		
Path in GIS database	jica_GISdata:/zahorska/raw_data/forests/vekovetriedyshp.dgn, kategorieshp.dgn lesshp.dgn		

B.8 Infrastructure

Table B.8.1 Location of Hydraulic Structures

Data set	Hydraulic structures (hydrotechnika)	**Ref. No.**	RO-SWMEPD-04
Contact person	Povodie Dunaja	**Source**	SWME PD
Origin	digitised from paper maps by Povodie Dunaja	**Format**	vector (MGE dgn)
Spatial coverage	Danube and Morava River Basins	**Scale**	1:10 000
Temporal coverage	none	**Projection**	Slovak Civil (JTSK)
Obtained coverage	Morava River Basin	**Topology**	point
Attributes/ Main items	- pumping station, shoa, barrier, barrage, gate, hydroelectric power station, functional block, stilling basin, outlets, spillway, location of withdrawal, location of outlet, limnigraph, water gauge, flood water gauge, gauging station, navigation lock, siphon, ship lift, groin, inverted siphon, culvert, aquaduct, water chute, fish ladder		
Processing	converting dgn to shp,		
Usage	Water management plans, irrigation plans, flood control		
Path in GIS database	Could not be obtained		

Table B.8.2 Irrigation and drainage maps

Data set	Irrigation and drainage map	**Ref. No.**	RO-SWMEID-01
Contact person	Dr. M. Jenco	**Source**	SWME ID
Origin	digitised from paper maps	**Format**	vector (Topol)
Spatial coverage	whole Slovakia	**Scale**	1:5 000 – 10 000
Temporal coverage	none	**Projection**	Slovak Civil (JTSK)
Obtained coverage	Study Area	**Topology**	line, polygon
Attributes/ Main items	- irrigation areas - drainage areas		
Processing	None		
Usage	irrigation and drainage system inventory, reference base		
Path in GIS database	jica_GISdata:/zahorska/raw_data/infrastructure/dr_brat.shp, dr_seni.shp, ir_brat.shp, ir_seni.shp		

Table B.8.3 Maps of irrigation and drainage project documents

Data set	Map documents of irrigation and drainage projects	**Ref. No.**	RO-SWMEID-02
Contact person	Dr. M. Jenco	**Source**	SWME ID
Origin	scanned and geo-referenced paper maps	**Format**	B&W image (tiff)
Spatial coverage	whole Slovakia (gathering not yet completed)	**Scale**	1:500 – 2 500
Temporal coverage	none	**Projection**	Slovak Civil (JTSK)
Obtained coverage	that is available for the Study Area	**Topology**	raster
Attributes/ Main items	- facilities: pipelines, hydrants, pumping stations, etc.		
Processing	vectorization of detailed elements of irrigation and drainage systems		
Usage	maintenance and rehabilitation of irrigation and drainage / melioration systems		
Path in GIS database	due to the size it was handed over to the counterpart on a separate CD-ROM		

B.9 Administrative boundaries

Table B.9.1 Map of Administrative Divisions of Slovakia

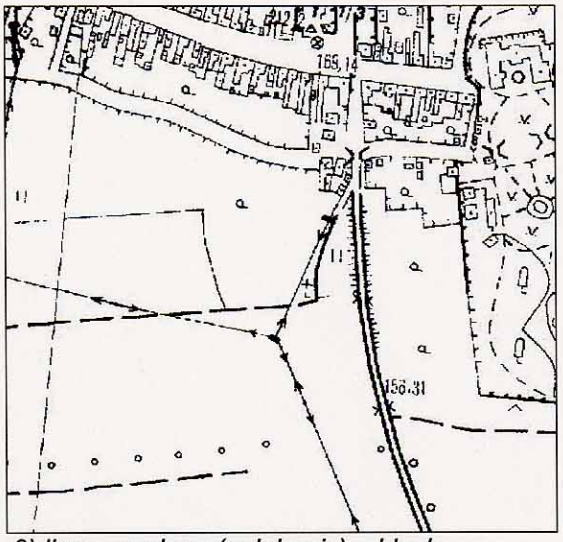
Data set	Administrative Divisions of Slovakia	**Ref. No.**	RO-GKU-02
Contact person	Ms. Gregusova	**Source**	GKU
Origin	digitised from paper maps	**Format**	digital vector (.e00)
Spatial coverage	whole Slovakia	**Scale**	1:10 000
Temporal coverage	regularly updated	**Projection**	Slovak Civil (JTSK)
Obtained coverage	Study Area	**Topology**	polygon
Attributes/ Main items	- Land Technical Unit (Cadaster UTJ) - Land Administrative Unit (ZUJ) - District Boundaries (OKRES) - Regions of Slovakia (KRAJ)		
Processing	None		
Usage	base map of administrative units, aggregating by areas		
Path in GIS database	jica_GISdata:/zahorska/raw_data/administration/ utj_jica.shp		

Table B.9.2 Protected Natural Areas

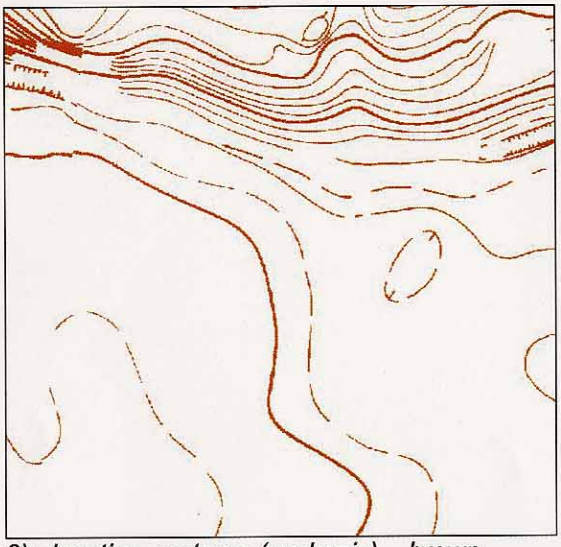
Data set	Protected Nature Areas of Zahorie	**Ref. No.**	RO-COPK-01
Contact person	Mr. A. Kurthy / Mr. R. Navrátil (for SR)	**Source**	SAZP COPK
Origin	digitised from paper maps	**Format**	vector (AV shape)
Spatial coverage	Zahorie Lowland (Slovakia at scale 1:50 000)	**Scale**	1:25 000
Temporal coverage	regularly updated	**Projection**	Slovak Civil (JTSK)
Obtained coverage	Study Area	**Topology**	polygon
Attributes/ Main items	- Protected Landscape Areas, - Nature Reserves, - Ramsar Area		
Processing	None		
Usage	sustainable land use planning, land classification and management practices		
Path in GIS database	jica_GISdata:/zahorska/raw_data/administration/protected_area.shp		

APPENDIX C- BASE MAPS OBTAINED AND PREPARED BY THE STUDY

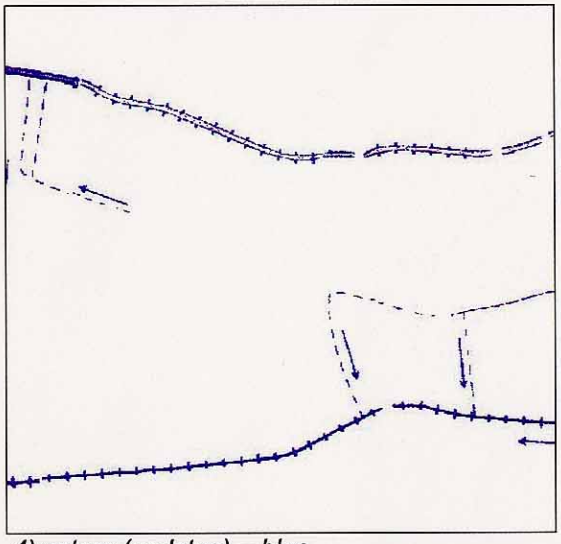
1) annotations (popis) – black



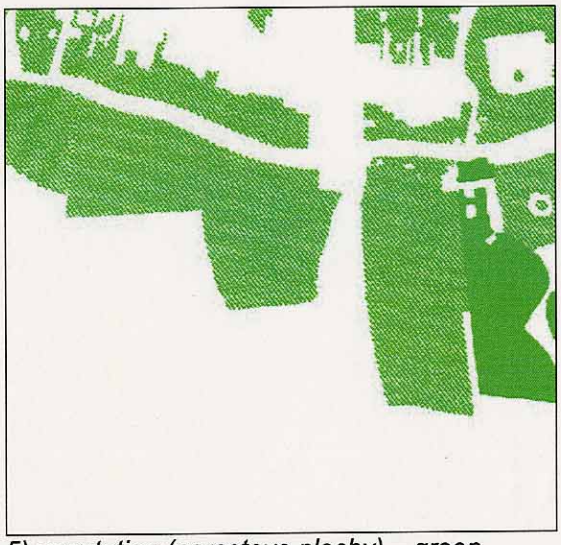
2) lines, markers (polohopis) – black



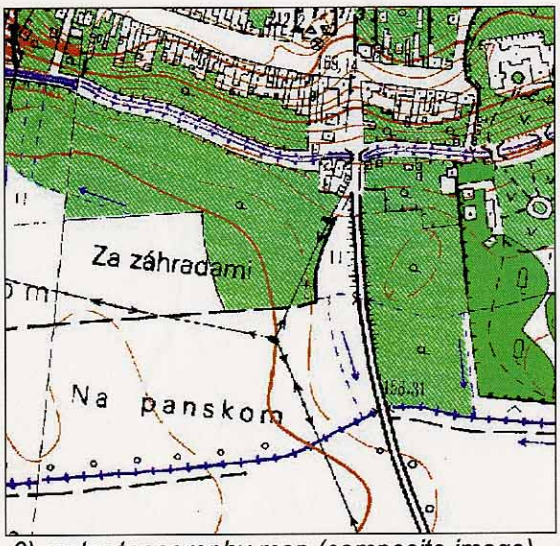
3) elevation contours (vyskopis) – brawn



4)waters (vodstvo) – blue

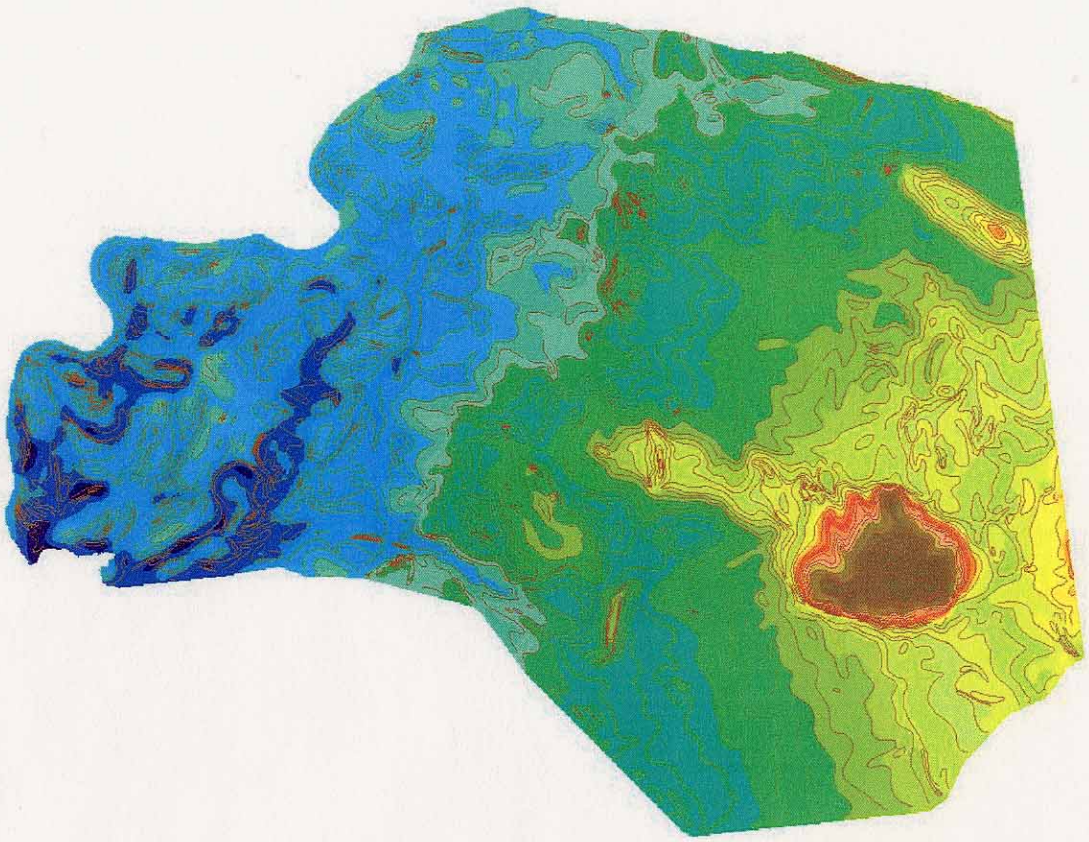


5) vegetation (porastove plochy) – green

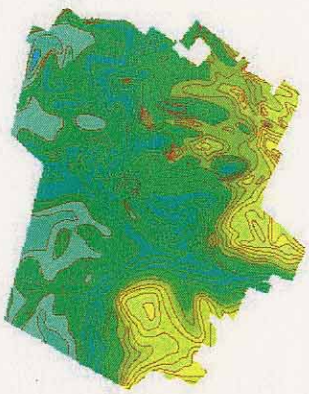


6) raster topography map (composite image)

Figure C.1.1 Topographic Map and map Layers (sample area south of Velke Levare)

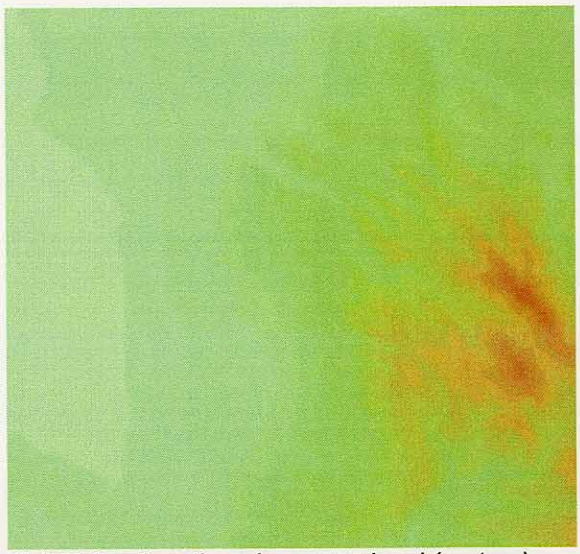


a) Case Study Area – Site A

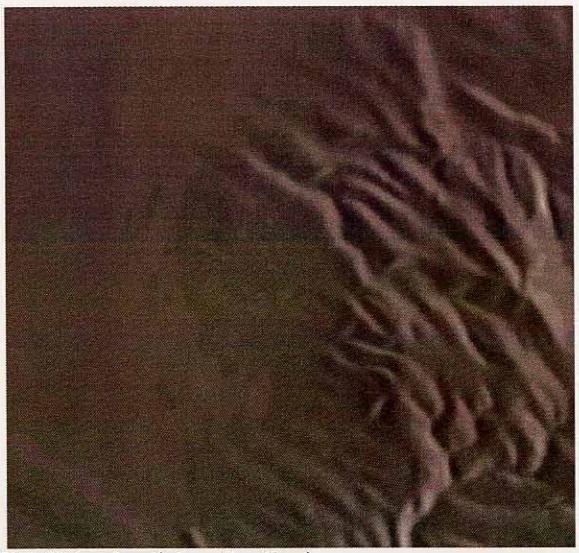


b) Case Study Area – Site B

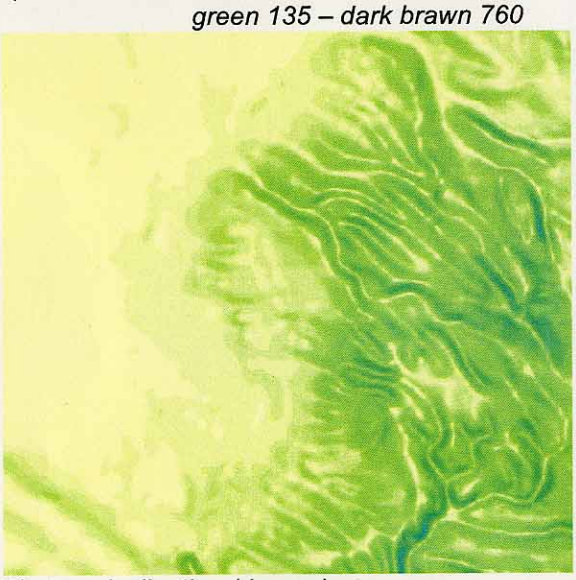
Figure C.1.2 Digital Model of Relief



1) DEM – elevation above see level (metesr)
green 135 – dark brawn 760

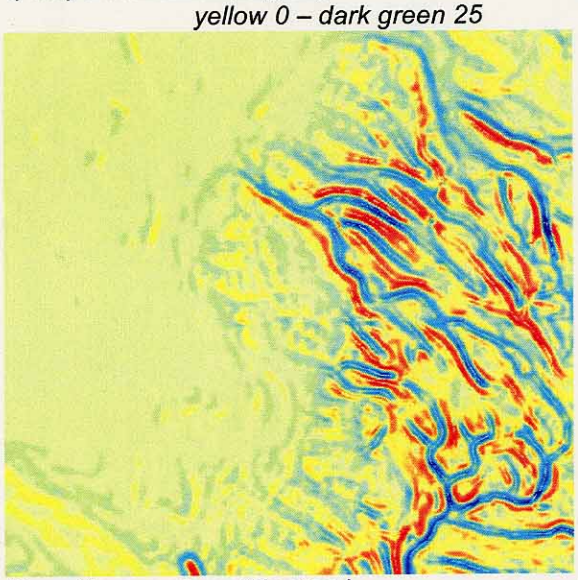


2) hillshades (visualization)

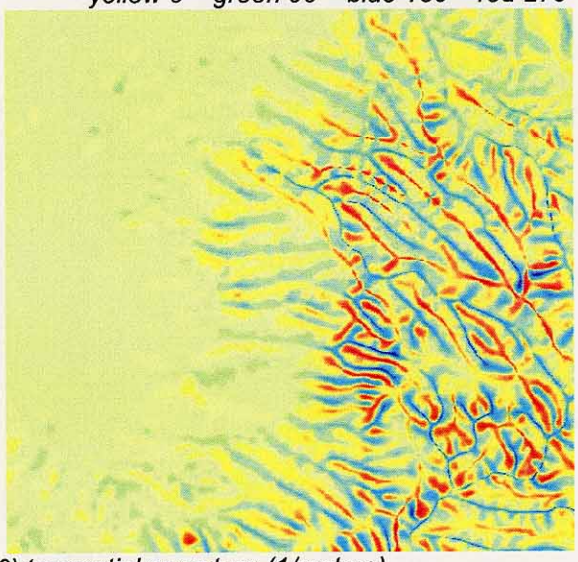


3) slope inclination (degree)
yellow 0 – dark green 25

4) aspect (degree)
yellow 0 – green 90 – blue 180 – red 270



5) profile curvature (1/meters)



6) tangential curvature (1/meters)
dark blue -0.04 – yellow 0 – dark red +0.04

Figure C.1.3 Digital Model of Relief (sample area: foot of Male Karpathy around Lozorno)