To the attention of the *Wallonia-Bruxelles International (WBI) Scholarship* Committee

here: Appendix for the Application for *WBI Scholarship* of
                 Lemenkova Polina, M.Sc, PhD student of the Technical University of Dresden*,*
                 for her research stay at *Institut de Gestion de l'Environnement et d'Aménagement du Territoire de la Faculté des Sciences de l'Université Libre de Bruxelles*
                 Av. F. D. Roosevelt, 50, B-1000 Bruxelles, Belgium

Duration: Two months, from the 01st of May 2012 until 30th of June 2012

Research Plan

for the research stay of the visiting PhD student Lemenkova Polina in *l'Université Libre de Bruxelles, Institut de Gestion de l'Environnement et d'Aménagement du Territoire*,
during the period of 01.05.2012-30.06.201,
under the supervision of Dr. Eléonore Wolff and Prof. Dr. Christian Vandermotten.

Research topic: **Application of remote sensing data & GIS methods for spatial analysis of land cover changes in urban environment: case study of Brussels, Belgium.**

Region of Interest: **Brussels urban area**

Research main aims: 1) Mapping of land cover patterns using Landsat TM imagery
                       2) Spatial analysis of changes in urban landscapes, Brussels

Expected results:
- Analysis of the urban landscape changes in Brussels
- Thematic maps of the and land cover changes in Brussels
- Report for the WBI resuming results of the research work
- An article resuming the results of the research work published in peer-reviewed journal (with focus on remote sensing / cartography / environment)

Detailed research plan (scheduled on two-week periods)

§ 1.   <u>01 May – 15 May</u>: **Data collecting and organizing**
   1. <u>Research purpose:</u> to apply open source GIS technologies & RS data (mostly Landsat TM) to study changes in land cover patterns and urban landscapes in the Bruxelles area, during the last two decades (1990-2010).
      The results of the study will be visualized as (1-2) maps detecting changes in land use.
   2. <u>Technical background:</u> The main software for raster processing would be *ILWIS* (*http://www.ilwis.org/*) and *GRASS GIS* (http://grass.fbk.eu/).
      The *ArcGIS* may be used as well (depending on availability and access to license).
   3. <u>Additional resources:</u> all possible available materials from the main library of the *Université Libre de Bruxelles, Institut de Gestion de l'Environnement et d'Aménagement du Territoire* - maps, books, reports & articles, relevant for research.
   4. <u>GIS Open source geodata sources:</u> geodata sources for the analysis of the landscape changes include aerial and satellite images from different time period (10-20 years). The available open sources will include some from the following: satellite imagery from USGS (http://www.usgs.gov/pubprod/), The Earth Science Data Interface (http://glcfapp.glcf.umd.edu:8080/esdi/index.jsp), GloVis (http://glovis.usgs.gov/),

aerial images (Google Earth), free Digital Elevation Models from the open source
http://geomorphometry.org/content/data-sets or ASTER GDEM
http://www.gdem.aster.ersdac.or.jp/search.jsp.
Any other available geodata sources will be considered as well: e.g. descriptive data, and
vector layers (shape files) and any other materials from the department resources.

§ 2.   15 May – 01 June: **GIS Mapping**
Creation of thematic maps in *GRASS GIS* and/or *ILWIS:* urban landscapes and land cover
changes in the last decades, case of Brussels area. Data geo-referencing (where necessary),
overlaying and preparing layouts. Spatial analysis of the thematic layers. Creating thematic
vector maps from raster imagery showing land use patterns around Brussels urban area.
Basic ground layers include following features:
- Ground layer showing relief, based on DEM, satellite images and topographic maps
- Urban infrastructure of the Brussels (vector layer): street network, buildings, etc.
- Satellite images of the research area taken in different time, for analysis of urban landscape
  dynamics in the past 10-20 years (depending on the available cloud-free imagery)
- Landscape patterns and land cover types in Brussels, Belgium: dynamics over last decade.

§ 3.   01 June – 15 June: **Spatial analysis of land cover patterns**
1. Regional studies of the land cover types, landscape characteristics and land use patterns
   of the research area. Image processing using supervised classification (ILWIS)
2. Landscape dynamics: overlay of the available data (aerial photographs, DEMs, vector
   layers and satellite images) using cartographic methods, to compare changes in
   landscape patterns at present and 10-20 years ago (time span 1990 - 2010).
3. The analysis of the environmental and man-made changes in the Brussels urban area is
   suggested to be based on detected changes in landscapes on rater imagery (Landsat TM).

§ 4.   15 June – 30 June: **Preparing final report and writing paper for publication**
1. Writing article for the publication in a scientific journal (focus on remote sensing):
   *"Mapping recent changes of land cover types in the urban environment: case study of
   Bruxelles, Belgium"*.
2. Preparing final report for the WBI, Bruxelles.

31st of August, 2011.

Scientific chief: Visiting researcher:
Dr. Eléonore Wolff   Polina Lemenkova, M.Sc