ISSN: 1857-9000 (printed version)
EISSN: 1857-9019 (electronic version)
UDC: 528:004
IMPACT FACTOR (2013): 0.386
(2014): 0.615

INTERNATIONAL
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REVISTA SHKENCORE NDËRKOMBËTARE

ISSN: 1857-9000 (versioni i printuar)
EISSN: 1857-9019 (versioni elektronik)
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Gjeo Informacione

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Dhjetor, 2015

INTERNATIONAL SCIENTIFIC JOURNAL

ISSN: 1857-9000 (printed version)
EISSN: 1857-9019 (electronic version)
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5

December, 2015

Publisher / Botues:
Geo-SEE Institute, Skopje, Macedonia www.geo-see.org

INDEKSIMI / INDEXING:

http://mmm-gi.blogspot.mk/p/indexing.html

South-East European Research Institute on Geo Sciences
"Geo-SEE Institute"
adress: str. Djon Kenedi, 25/1-d3; 1000 Skopje, Macedonia.
tel: + 389 2 6140-453; gsm: + 389 75 712-998
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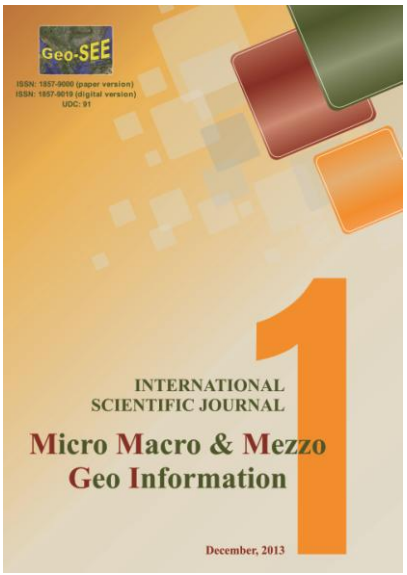
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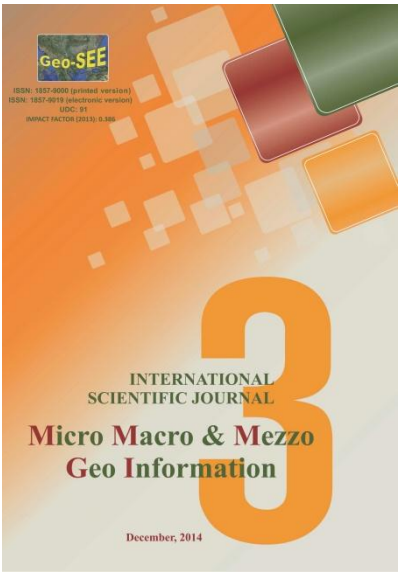
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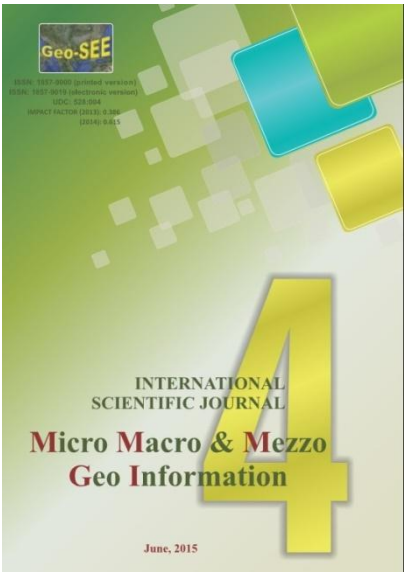
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Global Mapping Project-Activities and Way Forward

Masaki SUGA[1]

SUMMARY

Global Mapping Project is an initiative that aims at contributing to sustainable development through the development of globally consistent and reliable geospatial information. The Project is reaching 20 years since it started in 1996 and has been developing Global Map, fundamental geospatial information for sustainable development, in cooperation with National Geospatial Information Authorities (NGIAs) of 183 countries and regions around the world. Global Map data developed by 119 countries and regions as well as Global Elevation, Global Land Cover and Global Vegetation are currently available and downloadable from the website. Geospatial Information Authority of Japan (GSI), the Project's secretariat, took the central role in the data development of the latter three data sets. Further, in response to the growing awareness of the importance of using geospatial information in disaster risk reduction, the secretariat has developed web portals for Global Thematic Maps and Urban Hazard Maps as new services. This paper introduces these activities of the Project.

Key words: Global Map, Global Mapping Project, Sustainable Development, Fundamental Geospatial Information, Elevation, Land Cover, Vegetation, Disaster Risk Reduction

1. OUTLINE OF THE GLOBAL MAPPING PROJECT

Global Mapping Project was initiated by the Ministry of Construction of Japan (current Ministry of Land, Infrastructure, Transport and Tourism of Japan), to which Geospatial Information Authority of Japan (GSI) belongs, in response to the recommendation about the requirement of geospatial information for decision making in "Agenda 21", the outcome document of the Earth Summit in Rio de Janeiro in 1992. Based on the discussion on the

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scope of the Project in the International Workshop on Global Mapping in Izumo, Japan, in 1994, International Steering Committee for Global Mapping (ISCGM), a central body for the Project's implementation, was established in 1996. GSI has been continuously serving as the secretariat of ISCGM since then.

The mission of Global Mapping Project is to contribute to global sustainable development (including solving environmental problems and mitigating large-scale disasters) through the development of globally consistent and reliable geospatial information. In order to achieve this mission, the Project has been developing fundamental geospatial information which is called Global Map. The Global Map data have the following three characteristics:

a. Developed and authorized by National Geospatial Information Authorities (NGIAs) to ensure high reliability.
b. Developed under the consistent specifications for the entire globe.
c. Distributed free of charge for non-commercial uses.

As shown in Figure 1, Global Map data consist of eight layers: Boundary (e.g., administrative boundary), Drainage (e.g., river and marsh), Transportation (e.g., road and railroad), Population Centers, Elevation, Land Use, Land Cover, and Vegetation (Percent Tree Cover). Global Map is equivalent to 1:1 million scale in principle, but can be developed at a larger scale.

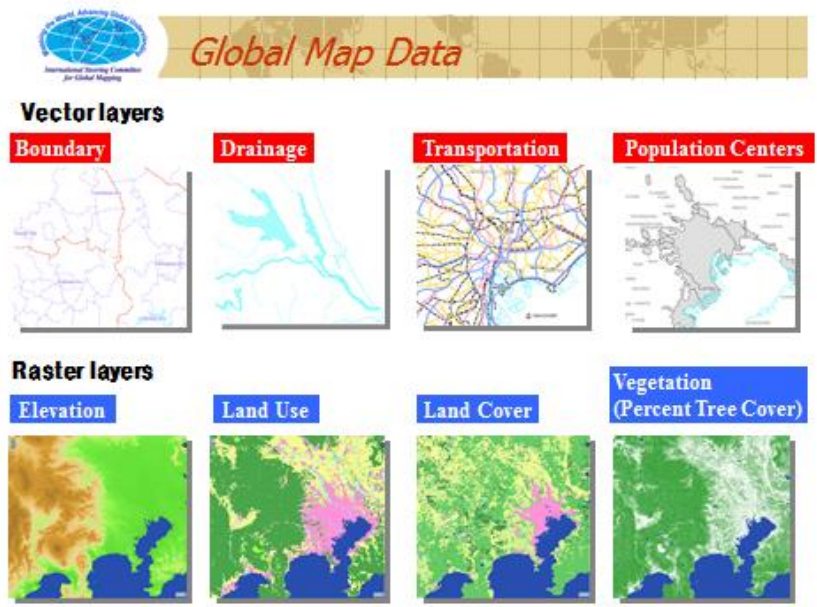


Figure 1: Eight layers of Global Map

In addition to these data, global version of three layers, namely Elevation, Vegetation and Land Cover, have been developed and released. GSI, serving as the secretariat of ISCGM, has been playing a central role in this activity. Details of Global Map data and their applications are described in Chapter 2.

After the establishment of the ISCGM, need of fundamental geospatial information for sustainable development, "Global Mapping," has been addressed in UN documents and other important meeting documents, including "Programme for further implementation of AGENDA 21" of the UN General Assembly in 1997; "Plan of Implementation of the World Summit on Sustainable Development (WSSD)" of WSSD in Johannesburg in 2002; and "The Future We Want" of the UN Conference on Sustainable development (Rio+20) in 2012. These references facilitated the cooperation of NGIAs in different countries for the Global Map development.

Dr. Paul Cheung, professor of National University of Singapore, is the current Chair of ISCGM that has the membership from 183 participating countries and regions, out of which 119 countries and regions have released their Global Map data. (See Figure 2)

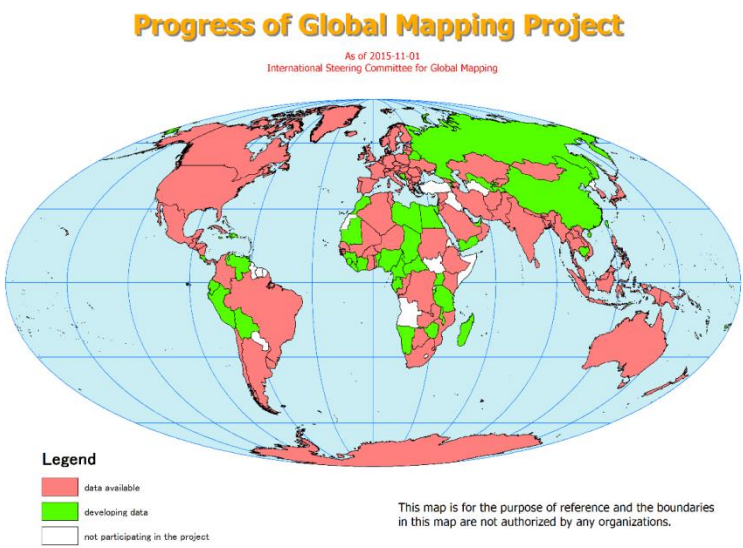


Figure 2: Status of development and release of Global Map data (as of Nov. 1, 2015)

To date, the ISCGM Secretariat has been implementing capacity building of NGIAs for Global Map development. Specifically, the ISCGM Secretariat has conducted a technical training at GSI for the development of Global Map in collaboration with Japan International Cooperation Agency (JICA) and has accepted a total of 112 training participants from 67 countries. Further, the ISCGM Secretariat has prepared tools and manuals for Global Map data development and its quality assessment. These efforts have significantly contributed to the strengthening of capacity of technical experts in NGIAs.

In addition, in order to meet the increasing need of finding global thematic maps and improving preparedness of urban areas against various hazards, the ISCGM Secretariat started developing web portals for Global Thematic Maps and Urban Hazard Maps in 2014.

The current activities of the Global Mapping Project, including these new efforts, are summarized as follows:

a. Development of fundamental geospatial information (Global Map) for sustainable development
b. Development of a web portal for easy access to different Global Thematic Maps, namely, Catalogue Service of Global Thematic Maps
c. Development of Urban Hazard Maps Web Portal to understand the disaster risk in urban areas in the world
d. Improvement of the ISCGM Website to use as a platform to disseminate these information
http://www.iscgm.org/index.html

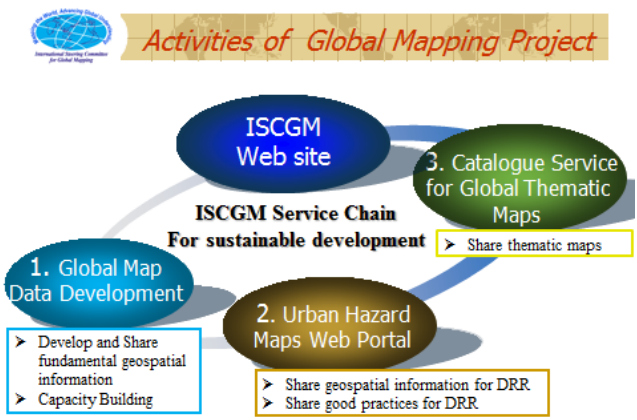


Figure 3: Activities of the Global Mapping Project

2. GLOBAL MAP DATA AND APPLICATION EXAMPLES

As stated in Chapter 1, Global Map data (Global Map's National/Regional Version) with eight layers developed by NGIAs are the main product of the Global Mapping Project. As a part of promoting applications of geospatial information, the ISCGM Secretariat uses Global Map to prepare status maps when major disasters take place to enable the international community to understand the disaster-affected areas at a glance. These status maps are posted on Relief Web (http://reliefweb.int/) maintained by the UN Office for Coordination of Humanitarian Affairs (UNOCHA).

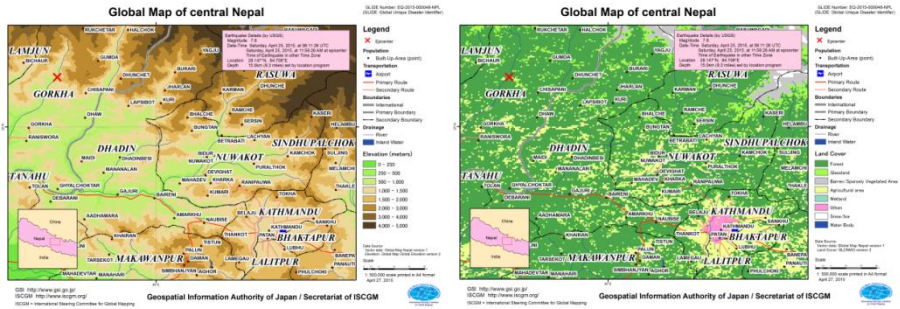


Figure 4: Example of disaster status map posted on Relief Web (Earthquake in Nepal in April 2015)

Further, GSI and collaborating organizations developed global versions of Global Map in three layers, namely Elevation, Land Cover and Vegetation. The Global Elevation version 2 was developed by GSI in 15 by 15 arcsecond (about 500 meters at the Equator) grid by using Global Multi-resolution Terrain Elevation Data 2010 (GMTED2010) prepared by the United States Geological Survey.

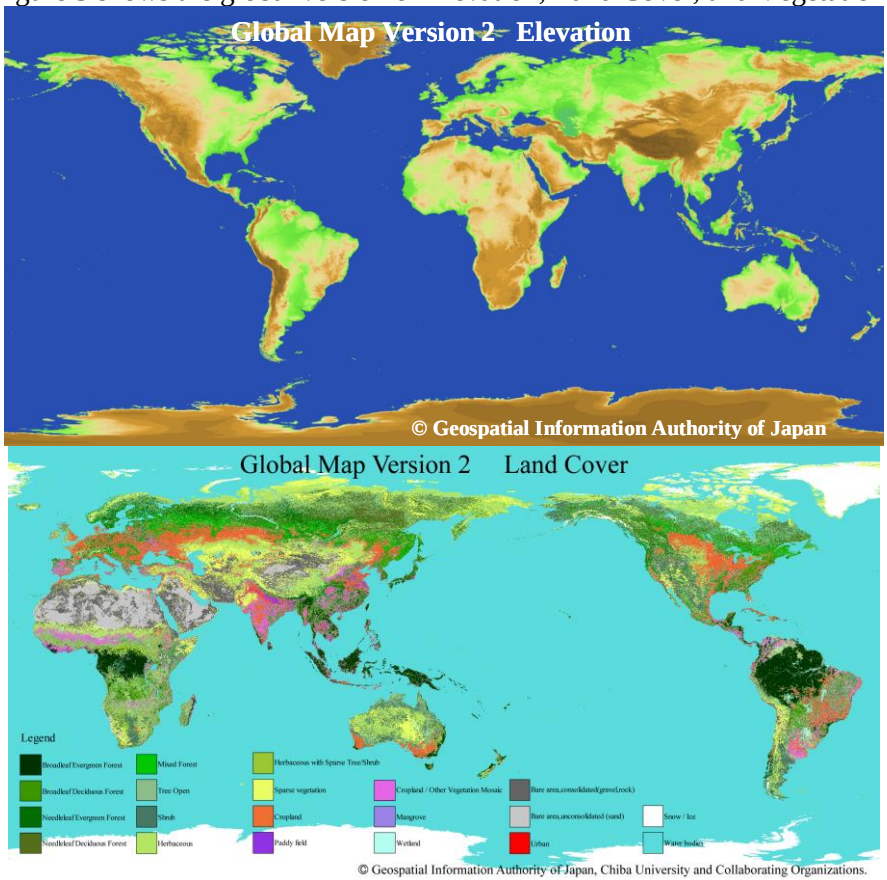
The Global Land Cover version 2 (GLCNMO2) and the Global Vegetation version 2 were also developed in 15 by 15 arcsecond grid by GSI, Chiba University, and collaborating NGIAs using imagery obtained by the MODIS sensor on board the earth observation satellites, Terra & Aqua. These data were developed using the data acquired in 2008. The outline of the methodology for the development of the Global Land Cover version 2 and its accuracy of classifications are reported in Tateishi et al., (2014).

The Global Land Cover data are classified into 20 categories, such as Forest (Phenology, e.g., Broadleaf and Deciduous Forest, are also classified.),

Herbaceous, Cropland, Bare area (rock and sand) and Urban, defined by Land Cover Classification System (LCCS) of the United Nations Food and Agriculture Organization (FAO).

The Global Vegetation is coded by the percentage of trees against ground surface (Percent Tree Cover) in 0-100 percent units when one views the tree canopy from directly above. For trees whose Percent Tree Cover has seasonal changes such as deciduous forest, the Percent Tree Cover value of the highest growing season is used.

Figure 5 shows the global version of Elevation, Land Cover, and Vegetation.



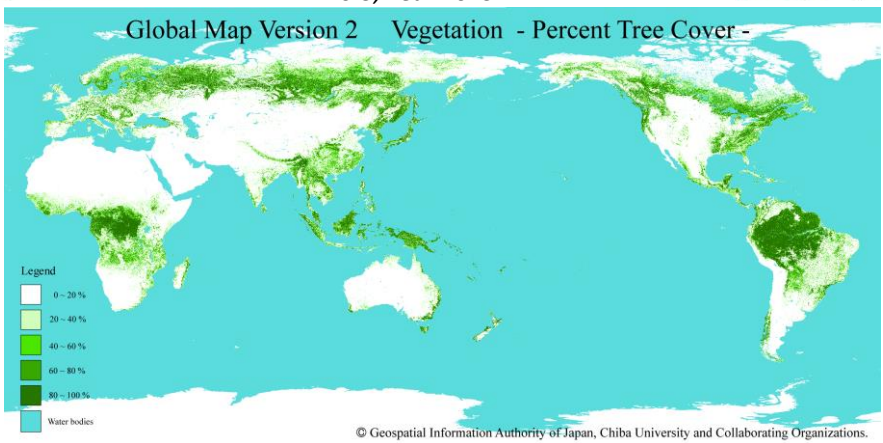


Figure 5: Global Map Global Version Vegetation, Land Cover and Global Version Vegetation (Version 2)

Ubukawa et al., (2013) reported a case that one can clearly identify temporal changes on the ground by repeatedly monitoring the Global Land Cover data. According to that report, decrease of Forest (green) and expansion of Urban (red) in Brazil's Amazon Region during 2003-2008 can be easily identified by simply aggregating land cover classes. Since the Global Land Cover data has high classification accuracy, it is useful to understand large-scale changes.

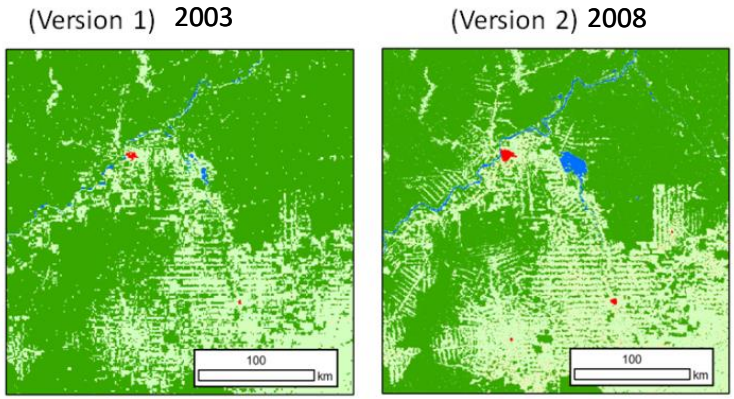


Figure 6: Global Map Global Version Land Cover (Brazil/Amazon) [Ubukawa et al., (2013)]

Currently, the ISCGM Secretariat is developing a prototype data for the next version of Global Land Cover data using the data acquired in 2013. After

verified and corrected by the participating organizations of the Global Mapping Project, it will be released as the next version in early 2016.

3. NEW ACTIVITIES

Geospatial information has been increasingly used in every phase of disaster risk reduction. For example, hazard maps enhance the preparedness of people against disasters. "Sendai Framework for Disaster Risk Reduction (SFDRR) 2015-2030" of the Third UN World Conference on Disaster Risk Reduction (WCDRR) in Sendai, Japan in March 2015, also clearly recognizes the importance of geospatial information, particularly in understanding disaster risks. The excerpt of SFDRR 2015-2030 concerning geospatial information is shown below (underlined by author).

National and local levels; (para 24):
(c) Develop, periodically update and disseminate, as appropriate, location-based disaster risk information, including risk maps, to decision makers, the general public and communities at risk of exposure to disaster in an appropriate format by using, as applicable, geospatial information technology;
(f) Promote real-time access to reliable data, make use of space and in situ information, including geographic information systems (GIS), … to enhance measurement tools and the collection, analysis and dissemination of data;

Global and regional levels; (para 25)
(g) Enhance the scientific and technical work on disaster risk reduction and its mobilization through the coordination of existing networks and scientific research institutions at all levels and in all regions,… disseminate risk information with the best use of geospatial information technology …;

In response to these emerging trends and needs of geospatial information, the ISCGM Secretariat has been developing web portals of Catalogue Service for Global Thematic Maps for easy access to different global thematic maps, and for Urban Hazard Maps to share hazard maps and risk maps. Currently, prototype versions of these two portals are being posted on the web for further improvement before their official release. (See Figure 7)

Catalogue Service for Global Thematic Maps (prototype version)
http://csgtm.iscgm.org/

Urban Hazard Maps Web Portal (prototype version)
http://www.iscgm.org/uhm/

Figure 7: Diagrammatic illustration of Catalogue Service for Global Thematic Maps and Urban Hazard Maps Web Portal

4. FUTURE DEVELOPMENT PLANS

At its 21st meeting, ISCGM agreed to support the secretariat's initiative of developing and maintaining Urban Hazard Maps Web Portal. Currently, however, only a limited number of urban hazard maps that have been found on the web are available on the Web Portal. The ISCGM Secretariat plans to cooperate with NGIAs and disaster management authorities in the world and encourage them to help enrich the contents of this Portal by the distribution of quarterly Global Mapping Newsletters, which are delivered to the members in 183 countries and regions, and by inviting them to ISCGM annual meetings.

In addition, the ISCGM Secretariat will continue its efforts of collecting best practices of geospatial information applications and services for disaster risk reduction in different countries, and make them available from the Urban Hazard Maps Web Portal.

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IMPROVEMENT OF VOLUME ESTIMATION OF STOCKPILE OF EARTHWORKS USING A CONCAVE HULL-FOOTPRINT

David N. SIRIBA[1], Sammy M. MATARA[2] and Sammy M. MUSYOKA[3]

SUMMARY

In the estimation of volume of stockpiles of earthworks, the question is no longer whether the data collected is dense and accurate (equipment and techniques capable of accurate data measurement are available), but how to manipulate the data to yield accurate volume estimation. Although surface modeling through TIN yields more accurate volumes than grid modeling, the delineation of footprint of the stockpile remains one of the main sources of errors in volume determination due to spurious surfaces created within the convex hull of the TIN model. In this paper, an approach for automatic delineation of the stockpile footprint based on a concave hull is introduced. A concave hull as a geometry (usually point data) container is realized by minimizing the enclosing planimetric area and it is usually not unique. Several algorithms for creating concave hulls are suggested, in this paper an algorithm based on Delaunay triangulation and linear referencing was used to create the concave hull. A comparison of volume estimations of stockpiles taking into consideration the footprint via convex hull, concave hull and manually delineated outline showed that volumes based on the concave hull are closer in value to volumes based on manually delineated footprint. Therefore in the absence of points manually picked to represent the outline of a footprint, the concave hull can be relied on.

Key words: Volume of Earthworks, TIN, Concave hull, Linear referencing, Footprint delineation.

1. INTRODUCTION

Estimation of volume of excavated and hauled materials is one of the most significant and common aspects of most engineering earthwork projects,

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such as route alignment, dam and tunnel construction and mining - among others. Precise and reliable planning, profit or loss depends on such estimations.

Data collection for volume estimation using conventional methods and techniques can be difficult, time consuming and largely inaccurate because stockpiles are usually uneven, on sloppy ground, and frequently not easy be fully accessed while taking measurements. With the current state-of-the art aerial and terrestrial laser scanning technology, it is increasingly becoming more probable that more accurate measurements can be obtained, and with more accurate surface modeling techniques, more accurate volume determinations are made possible. This possibility has made it necessary for almost all Geographic Information System (GIS) and Computer Aided Drawing and Design (CAD) applications to incorporate techniques for volume computation; in fact, there is no longer any difference in the volume estimated using either GIS or CAD tools, because they all use Delaunay triangulation, which produces unique results.

Although the use of laser scanners afford faster and accurate point data measurement, a new challenge of data filtering is introduced, which if not carefully handled can lead to erroneous results. Similarly, the availability of easy-to-use tools in both GIS and CAD applications for volume estimation sometimes one may assume to critically evaluate the results.

Estimation of volume of a stockpile would ordinarily involve data collection and the subsequent computation. Both these two processes present opportunities for errors. During data collection, the accuracy of the measurements (equipment and measurement techniques), and the sampling of representative ground points (sampling can be done after field measurements through filtering) influence the accuracy of the estimated volume. During the computations, the method of computation (for example, raster or vector modeling) affects accuracy of the volume determination.

The purpose of this paper is to evaluate the effect on volume of unclear delineation of the footprint of a stockpile. If no effort is made to delineate the stockpile footprint at the time of data collection or during data processing then errors in the resulting estimations should be expected. The next section gives an outline of the array of techniques of data collection and computation for volume estimation. This is followed by discussing and demonstrating how a footprint of a stockpile can be delineated using a concave hull. The effect of unclear delineation of the footprint on volume estimation is then demonstrated on some experimental datasets.

2. VOLUME ESTIMATION

2.1 Data Collection

Stockpiles and storage areas in most engineering earthwork projects are generally measured by manual techniques. This is often tedious and risk prone especially if measurements involve climbing up and down and round high mounds of materials. This is because of the limitations imposed by the measuring equipment and techniques involved. However, with the current plethora of survey measuring techniques, fast and accurate data collection is possible.

There are multiple surveying options for measuring stockpiles, mineral deposits or waste dumps. Methods that can be used to obtain three dimensional coordinates that define the formation surface of the stockpile include: tacheometry, Real Time Kinematic (RTK) GPS, aerial photogrammetry, and air-borne and terrestrial laser scanning.

Tacheometry is a conventional method of surveying, where distances and heights are determined from instrument readings alone, from which three-dimensional coordinates can be derived. It is an indirect way of measurement. Depending on the technique adopted, either a conventional theodolite or a total station may be used.

A total station can be used in conjunction with or without a reflector. Here the operator is required to identify and mark suitable instrument stations around the stockpile that will afford full coverage (or view) of the surface. At each instrument set up, points (x,y,z coordinates) are picked at the foot of the pile to define the ground surface followed by points on the surface of the pile to define the formation surface. The instrument operator should pick the points that define the formation and foot of the stockpile more carefully to minimize errors, similarly as many points as possible should be picked to accurately define the formation surface. The number and distribution of the points, influenced by the complexity of the surface, determine the accuracy of the estimated volume.

The Global Positioning System (GPS) and of course other Global Navigation Satellite Systems (GNSS) are used to locate points on the Earth's surface without using terrestrial targets. Depending on the application, the GNSS receiver can be used in different measurement modes (El-Rabbany, 2006), but ultimately yielding three-dimensional coordinates of a point just like tacheometry. RTK positioning technique is the obvious choice where fast but accurate data are required. RTK GPS positioning is capable of delivering accurate real-time positions (about 2-5 cm) in the field with a possibility of improvement if a longer period of station observation (i.e., about 30 second)

is adopted. RTK GPS can be operated by one person alone and is faster than a total station. The downside of this technique is that the GNSS receivers cannot work especially for materials under sheds or dense tree canopies or under high voltage power lines and it is dangerous to climb up high mounds of materials.

Using aerial photogrammetry, volume of material can be determined from stereo photographs of material heaps. This is an efficient method of data collection for medium scale projects because the climbing up and down of material is completely avoided. If conventional photogrammetric procedures are employed, then this is a relatively expensive technique and the data processing is quite elaborate; besides, it is not appropriate for materials under sheds or trees. However, if completely near-real-time processing of all data on-the-fly from an aerial photogrammetry mission is possible after landing, then products like ortho-images and elevation data (x, y and z-coordinates) are ready-for-use. Such real-time phogrammetric systems are commonly referred to as UAV-Based photogrammetric mapping systems (Wu et al, 2004). In these systems, photographs are taken with digital cameras, and simultaneously registering of the projection centre co-ordinates and the rotation angles (φ, ω, κ) using GPS and IMU (Inertia Measurement Units) techniques, in what is generally called direct georeferencing.

Laser scanning is an active measurement method that allows measurements in either daytime or at night (Vosselman and Maas, 2010). Laser scanning is now a common technique for generating high quality 3D representations of the landscape by capturing 3D point clouds. The fundamental concept of laser distance measurement and scanning applies to both air-bone and terrestrial systems, respectively referred to as Air-borne Laser Scanning (ALS) and Terrestrial Laser Scanning (TLS) respectively. Both ALS and TLS have relative advantages and disadvantages depending on the problem (Young et. al., 2010). Laser scanning is capable of measurement accuracies ranging from 5-10 mm (Karsidag and Alkan, 2012).

Terrestrial Laser Scanning (TLS), which is similar, to some extent, to the technique of using reflector-less total station, can afford fast results with a single operator, and is capable of high accurate results. The downside of laser scanning and especially for terrestrial measurements is the likelihood to miss sunken points that may not be visible from the instrument station, thus giving a wrong impression of the measurements as illustrated in Figure 1.

Airborne Laser Scanning (ALS) is similar to airborne photogrammetry in several respects, in which point data is measured from an airborne sensor. In both aerial photogrammetry and ALS, point coordinates are automatically picked, resulting in what is called a point-cloud. It has been established that the point density (number of points per unit of area) required to generate an accurate surface modeling, most commonly a Digital Terrain Model (DTM),

depends on the complexity of the terrain being represented. Therefore, point datasets from such systems can withstand substantial data reduction while maintaining adequate accuracy for elevation predictions (Liu et al., 2007).

Figure 1: Laser scanned positions shown with arrows in green, positions that have been missed out ("shadowed") shown by arrows in red; the observer is at the left hand side of the heap in the figure.

Photogrammetry and airborne laser scanning techniques are compared with respect to 3D mapping for volume measurement of stockpiles in Table 1.

Table 1: Comparison of photogrammetry and laser scanning

Photogrammetry	Laser scanning
Fast but not for real time applications	Fast and for real-time applications
High accuracy when sophisticated algorithms are combined	Possible data loses when the resolution is low
Multi image configuration	Not applicable at high altitudes
Amount of information can be controlled	Huge amount of information

2.2 Methods of Volume Estimation

The three general methods for calculating earthworks include: volume from cross-sections; volume from contours; and volume from spot heights (e.g., Bannister and Raymond, 2005;, Schofield, 1993).

The method of volumes from sections is capable of general application only when the formations have a constant width and side slopes, as illustrated, for example, in Figure 2 a), with the red outline. Once the length, width and height of the stockpiles have been measured, the volume is then computed by simply multiplying the length by the width by the height or applying the different formulae as found in most surveying textbooks. Cross sections are, as a rule, selected at intervals of 5, 10, 20, 50 and possible 100 m, depending on the segmentation of the shape. This method is only an approximation, and the formations are rarely of uniform shapes (see Figure 2 b)), and is mostly used on narrow works, such as roads, railways, canals, embankments.

Figure 2 a) stockpile with regular surface Figure 2 b) stockpile with irregular surfaces

The method of volume determination by contours assumes that the contours have already been created. The method depends on the area between any two successive contours and the difference in height between the two contour lines. The stockpile is divided into layers using horizontal planes crossing the pile at the contour line. Similar to the vertical cross section, Simpson's rule (Equation 1) can be used. The rule can be interpreted as follows: one third the distances between the ordinates, multiplied by the sum of the first and the last ordinates, plus four times the sum of even ordinates, plus twice the sum of the odd ordinates. This equation requires an odd number of ordinates; however with some slight modification an even number of ordinates can also be used. This method is however rarely used owing to the fact that contours are derivatives of basic measurements, and would therefore not be as accurate.

$$V_i = \frac{w}{3}\left[(h_1 + h_7) + 4(h_2 + h_4 + h_6) + 2(h_3 + h_5)\right] \qquad (1)$$

Volume determination from spot heights is the most common method used particularly for large open excavations or heaps, and takes point data as

input. Traditionally, the method entails dividing the area into squares or rectangles and then taking the levels at each of the corner points. Only a level and leveling staff are required to measure the levels. This way, the third coordinate (height) is associated with a temporarily horizontal surface (x, y coordinates). It therefore means that every time a volume has to be determined, a temporary horizontal surface has to be assumed, which means that stockpiles that are far apart cannot be easily referred to a common horizontal reference, and it is nearly impossible to make incase measurements have to be repeated. If however, the spot heights are irregularly spaced, then volume computation is determined from a vector- or raster-based surface model.

3. VOLUME ESTIMATION THROUGH SURFACE MODELING

Surface modeling has become an important element in the processing and visualization of three-dimensional geographic information. Models are created from a finite sample of data points over the area of interest. The techniques used for surface modeling can be broadly divided into raster-based interpolation methods and vector-based triangulation methods. In a raster, a DTM is structured as a regular grid consisting of a rectangular array of uniformly-spaced equally-sized cells with sampled or interpolated z-values. In vector, a more advanced, more complex, and more common form of DTM is the Triangular Irregular Network (TIN), which is constructed as a set of irregularly located nodes with z-values, connected by edges to form a network of contiguous, non-overlapping triangular facets. Both raster and vector surfaces are created using two main methods: interpolation and triangulation, respectively.

According to Meenar and Sorrentino, (2009), in TIN modeling, there is a possibility of higher resolution in areas where the surface is more complex, and therefore the TIN creation process makes it more reliable than the grid approach. TIN modeling, which preserves the original data upon modeling, is mostly used in smaller areas, for more detailed, large-scale applications. On the other hand, in grid modeling there is loss of initial data, due to interpolation, and is commonly used in more regional, small-scale applications.

Grid and TIN surface structures have dimensional properties between 2D and 3D with no underlying or overlying information; they are sometimes described as 2.5D data. Therefore, their usefulness is limited to basic queries, such as slope and aspect calculations, contouring, hill-shading and view-shed analysis.

These surfaces are not considered as true 3D structure. This is because they do not contain multiple z-values at the same (x,y) location, therefore they cannot be used to model overhangs and tunnels, and support accurate volumetric calculations. To be useful for volume determination, two surfaces (raster or TIN) are required, with one surface functioning as the formation surface (upper surface) and the other as a reference/datum surface (ground surface). Mass points and break lines are collected that describe the upper surface. Volume of a surface is usually determined relative to a given base height, or reference plane, can be another surface.

3.1 Volume Calculation from TIN Surface Model

TIN model is the most appropriate model for computation of earthworks. The Delaunay triangulation is most commonly used approach to construct a TIN rather than other, less restrictive triangulations. In a Delaunay triangulation, the circumscribing circle of any triangle contains no other vertices (Shewchuck, 1996). Delaunay triangulation of a set of vertices is unique; this is an important quality, which allows one to repeat the calculations and to verify the results independently.
To calculate the volume enclosed by two TIN surfaces, let the planimetric surface of a triangle I in the upper TIN surface be Ai (Figure 3), href be the height of the horizontal reference plane (lower surface), and h_i be the elevations of the three vertices of triangle *i*. The volume generated by one triangular prism is determined by the prismodial equation:

$$V_i = \frac{A}{3}\sum_{i=1}^{3}(h_i - h_{ref}) \qquad (2)$$

The sum of the individual triangular prisms represents the volume enclosed by the two surfaces. If the input surface is a raster, its cell centres are connected into triangles. These are then processed in the same fashion as the TIN triangles.

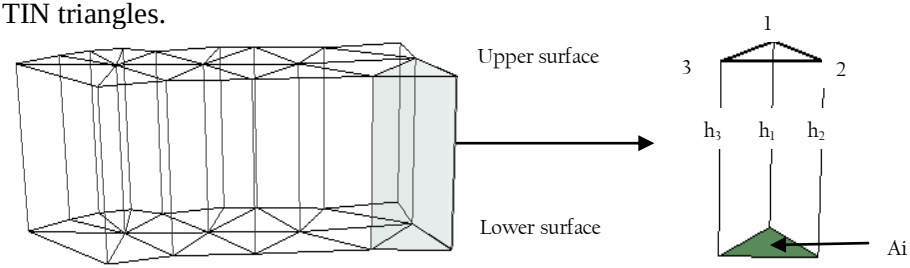


Figure 3: Illustration of a two surface TINs and a triangular prism

3.2 Error in Volume Computation from a TIN Model

The TIN model approximates the terrain surface using a network of triangles connected together. The difference between the TIN and the modeled surface are considered to be model errors. These errors are partly due to errors in the data and errors in approximation (Hao and Pan, 2011).The error in data is stochastic, and is introduced in the original data, as a result of the survey equipment and the method of measurement. The data errors are both in height and planimetric measurements (Wulf, et. al., 2012). The model (or representation) error is determined by the quantity and distribution of sampling points, which in turn are an important indicator of the accuracy of the TIN model.
Another source of error in volume estimation when using TIN modeling is the unclear definition of the stockpile footprint/outline. This is commonly the problem if the data points are picked automatically or hand digitized, it is not explicitly indicated which points represent the footprint.

4. STOCKPILE FOOTPRINT DELINEATION

During TIN modeling, the footprint of stockpiles, if not explicitly indicated, it is represented by the planimetric convex hull of the points. The convex hull is perhaps the most basic and common geometry container that is used in computational geometry. The convex hull has been applied in many fields, for example, business, engineering, science, daily life and so on.
The convex hull is used in particular when the only objective is to minimize the outline length. If used to represent the outline of stockpile, then extra area and volume are included. To define the footprint more precisely, a hull with minimum area should be used. Such a hull is called non-convex (or better- a concave hull).

4.1 Concave Hull

A concave hull is a concave polygon that encloses all geometries within a set, but has less area compared to the convex hull. Because of minimizing the area, the concave hull's line length is longer than the corresponding convex hull. A concave hull could be suitable for some real-world problems, for example, finding the boundary of a city based on the amalgamation of the land parcel boundaries.
Computing the concave hull is considered one of the complicated problems in geometry, and as such, there are many variations of it (Sunday, 2006),

which can be used depending on the intended application. However, there are currently no algorithmic fundamentals that exist for the creation of a concave hull. This is because the algorithms for concave hulls are much more complicated than convex hulls- because several variations dependent on constraints are possible. Moreover, for any given set of points, there may be lots of different concave hulls. In this regard, we present an approach for the creation of a concave polygonal hull based on the concept of linear referencing. The approach was motivated by the need to delineate the outline of a set of points where this has not been done by manual means. After a review of the few algorithmic efforts to construct a concave hull, some theory on linear referencing is presented followed by a discussion on the algorithmic implementation of the concave hull.

The concave hull approach is a more advanced approach used to capture the exact shape of the surface of features contained in a dataset. However, producing the concave hull is difficult; this is because of several possible and often conflicting objectives. Little work has focused on concave hull algorithms.

Galton and Duckham (2006) suggested 'Swing Arm' algorithm based on gift-wrapping algorithm. In the 'Swing Arm' algorithm, the polygon hull is generated by a sequence of swings of a line segment of some constant length, r (the swing arm). The initial line segment is anchored at an external point, and at each subsequent step, the line segment is anchored to the last point added to the hull, and rotated clockwise until it hits another point in the hull. If r is not less than the longest side of the hull perimeter, then the procedure will generate the convex hull; but if r is shorter, the resulting polygon is concave. The 'Swing Arm' Algorithm may produce separated concave hulls instead of single one, a situation that may not be desirable.

Another approach is based on alpha shapes, first described by Edelsbrunner (1981). Alpha shapes are considered as a generalization of the convex hull and a sub-graph of the Delaunay triangulation. They can be used in place of simple convex hulls to create a polygonal boundary containing the geometric objects within it. Mathematically, alpha shapes are defined as a family of shapes that can be derived from the Delaunay triangulation of a given point set with some real parameter, "alpha" controlling the desired level of detail. For sufficiently large alpha, the alpha shape is identical to the convex hull, while for sufficiently small alpha, the alpha shape is empty. As such, the resulting shape is neither necessarily convex nor necessarily connected. Alpha shapes maybe good, but sometimes they are not flexible enough because the alpha parameter is fixed. The "alpha-shape" algorithm based on Delaunay triangle suggested by Duckham et al. (2008) is similar to the concept of alpha shapes, and has the same weaknesses.

Adriano and Yasmina (2007) suggested a concave hull algorithm based on the k-nearest neighbours approach. The algorithm, although fundamentally designed for a set of points, can be used for other geometry primitives. The undesirable feature of the algorithm is that holes are produced in the resulting concave hull even when they are not expected.

4.2 Concave Hull through Linear Referencing

In the approach presented in this paper, the concept of using linear referencing (Curtin et al., 2007) to create a concave hull of a set of polygon features is described in Siriba (2012).Linear referencing as a process consists of a number of steps. The typical steps for a linear referencing are as follows:

a) Identifying the underlying linear feature (or the route structure) to which events can be referenced;
b) Defining and identifying measurements along the identified route (linear feature);
c) Output of linearly referenced events.

a) Identifying the underlying linear feature

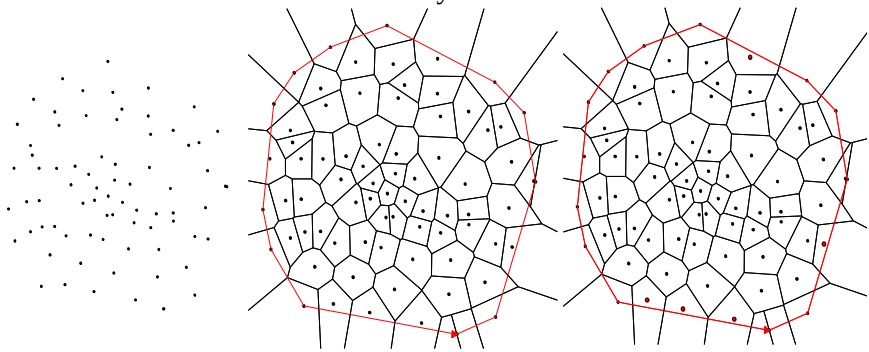
The first step in linear referencing is to define the reference linear feature or network. However, a dataset consisting only of a set of points (Figure 3a)) does not consist of a linear network or linear features. The representative linear features from such dataset would include extracting the outlines of all the polygons. In this technique, such an outline, as the initial reference linear feature, is approximated by the convex hull of the polygon (Figure 3 b)).

b) Defining and making measurements along the linear feature

The event data (points) to be referenced and the direction of measurement are identified. The points to be referenced should include all "outer points". This is achieved by identifying the points whose Thiessen polygon intersects with the reference linear feature, initially approximated by the convex hull. The Thiessen polygons are used as a means to identify the points that will eventually form the concave hull because each Thiessen polygon technically represents one individual point, and for all candidate points represented in red (Figure 3 c) of interest, their Thiessen polygons should definitely overlap (intersect) with required concave hull.

After the first iteration, points whose Thiessen polygons intersect with the convex hull (red outline in Figure 3 c) are identified. These points are then referenced to the reference linear feature, the outline of the convex hull represented by the red outline in the figure. The starting and end point (and therefore its direction) of the reference linear feature are depicted by the red arrow. Linear referencing is done as follows: for each identified point, its distance from the start of the reference linear feature and its offset from the

reference linear feature are calculated and this constitutes the reference information. Then, a new reference linear feature is created, from all the identified points (red dots). This new reference feature is used to create the outline of a new concave hull, which effectively replaces the earlier one. This procedure is done iteratively until no more points can be identified and the concave hull cannot be modified any further.

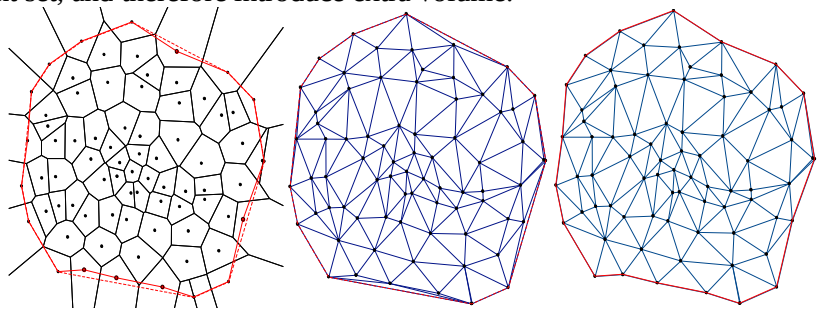


a) b) c)

Figure 4 a) point on plan b) initial approximation of the concave hull by the convex hull; b) additional candidate points for the concave hull

c) Output of linearly referenced events.

The linearly referenced points are consecutively constituted into a linear ring from which the concave hull is build. Figure 5 shows the final concave hull (red outline) created from the points identified after two iterations. The initial concave hull approximated by the convex hull is depicted by the red broken outline. The new outline delineates the footprint of the point set and is used to limit the triangulation of the points during volume estimation. The resulting triangulation based on the convex hull and the concave hull are respectively illustrated in Figure 5 b) and 5 c). It is evident from Figure 5 a) that there is extra surface at the border that is considered to be part of the point set, and therefore introduce extra volume.



a) b) c)

Figure 5 The convex hull – broken red outline and the final concave hull in red

5. EXPERIMENTATION

The spurious border polygons created as a result of unclear delineation of the stockpile introduces extra volume. With an experiment of 7 stockpiles, the spot heights were measured with RTK technique. For each pile, the footprint of each pile had been manually picked, although the points were not equally spaced. During computation of the volume, it was assumed that the footprints had not been identified, in which case the footprints were taken as the convex hull of the data points. Because of the spurious volumes at the periphery, the footprints were refined based on the concave hull of the points. The concave hull was created as described in the previous chapter. Finally, the volumes were computed using the manually delineated footprint. Table 2 shows for the seven samples, the volumes calculated based on the three sets of footprints.

Table 2: Comparison of volume based on the convex hull, concave hull and manual delineation of the stockpile footprints (units in cubic meters)

Stockpile	Convex Volume (A)	Concave Volume (B)	Manual Volume (C)	Absolute Difference || C - A ||	Absolute Difference || C – B ||
1	71.44	70.13	70.13	1.31	0.00
2	224.36	220.73	221.92	2.44	1.20
3	724.74	739.34	740.39	15.64	1.05
4	1048.74	1019.61	1023.29	25.45	3.67
5	1840.27	1857.27	1886.96	46.70	29.70
6	1887.25	1571.78	1643.94	243.31	72.15
7	4518.20	4430.77	4204.85	313.35	225.93

The difference between the manually delineated footprint and the footprint based on convex and concave hull are presented in the last two columns of Table 2. From the differences, it is clear that the volumes based on the concave hull footprint are closer to those based on the manual footprint. Although it is expected that the volume based on manual and concave hull footprints should be less than the volume based on the convex hull footprint, because spurious volumes are reduced, there is however a contradiction in sample 3 and 5. This is because in the data points representing the footprint are not uniformly spaced, thereby proving an opportunity for spurious volumes during triangulation. In particular, the convex hull approach is

subjective, when setting the parameter. A unique result can only be realized if the data points representing the footprints are uniformly spaced.

6. CONCLUSIONS

A clearly delineated stockpile footprint is one way of ensuring that accurate volumes are determined. In case no deliberate effort has been made to identify it during point data collection, the resulting data can best be approximated by at least by a convex hull, but at best by a concave hull. A more representative outline, and therefore footprint can be achieved if the outline data points are more uniformly spaced – something that can be done during data collection. Prior to any manipulation of the point data to compute the volume the footprint, the boundary should be known in advance and picked during field data collection, and at uniform spacing.
The algorithm of the concave hull presented here is not based on any constraint and should therefore yield unique results and therefore more robust than those based the algorithms cited in this paper, which however depend on some constraints.

Acknowledgement
We acknowledge the East African Portland Cement Company ltd (Kenya), who provided the stockpiles of earthwork used for experimentation.

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DIGITAL EARTH APPROACH for PAN-EURASIAN EXPERIMENT (PEEX Program)

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ABSTRACT

Pan-Eurasian Experiment (PEEX) is a multi-disciplinary, multiscale initiative project addressed global challenges, such as climate change and air quality. Therefore, PEEX data should be combined with unique global multiscale geospatial context. This type of context is provided by Digital Earth concept only. Synthesis of PEEX data and Digital Earth geospatial context within same framework provides new quality of situational awareness through synergy of heterogeneous dataset. In the paper theoretical aspects of PEEX and Digital Earth as well as implementation of this approach are discussed.

Key words: PEEX, Digital Earth, Digital Protvino.

PEEX CURRENT STATUS

Pan-Eurasian Experiment (PEEX) program (https://www.atm.helsinki.fi/peex) is a multi disiplinary, multiscale bottom up initiative launched in 2012 by the University Helsinki (Atmospheric Sciences) and Finnish Meteorological Institute together with the strong support by the Moscow State University (MSU) and AEROCOSMOS. These institutes have been the leading initate partners in PEEX. [Lappalainen et al. 2014]. The main focus of PEEX is to solve interlinked global challenges, such as climate change and air quality, influencing societies in the Northern

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UDC: 528.7-027.511:[004.6:004.932

Eurasian region [Kulmala et al. 2015]. At the moment the initiative is involving research communities from Russia and China and from several countries in Europe. Altogether 80 institutes have contributed the PEEX Science Plan, which identifies the PEEX Program and introduces the research agenda, the components of the future PEEX research infrastructure and the topics relevant for impact making and outreach activities. The PEEX research agenda identifies the most urgent large scale research questions and topics of the land-atmosphere-aquatic-anthropogenic systems and interactions and feedbacks between the systems for the next decades [Lappalainen et al. 2015]. This expedites the utilization and combining of new scientific knowledge for producing a more reliable climate change scenarios at regional and global scales, and enables mitigation and adaptation planning of the Northern societies.

At the moment PEEX is collecting new scientific knowledge via opening of PEEX Special issue in the Journal of Atmospheric Chemistry and Physics (http://www.atmos-chem-phys-discuss.net/special_issue265.html). The special issue serves as a first platform collecting PEEX relevant scientific results for the first PEEX science assessment. PEEX will also setup a research approach where the environmental observations are analyzed together with the societal data for predicting future pathways of the Northern Pan-Eurasian environments and societies. The Assessment(s) will be distributed to different stakeholders and policy making processes such as Arctic Council, IPCC, Future Earth and the European, Russian and Chinese ministries.

PEEX operates in an integrative way; and it aims at solving the major scientific and society relevant questions at many scales using tools from environmental and social sciences and economics (fig 1.). Compared to traditional cartography methods Digital Earth play crucial role when large quantities of different type of datasets (environmental, social, economic parameters) are analyzed and the research results needs to visualized and introduced in an end-user friendly way. This is especially case when the analysis needs to be introduced to decision makers. Furthermore, the Digital Earth – Google Mapping can used in educating scientist in order to make powerful data analysis.

Nevertheless, implementation of Digital Earth concept for aggregating vast quantities of data in multiscale manner raised questions, because multiscale representation is strictly prohibited by fundamental rules of cartography. Therefore, we need to investigate the nature of Digital Earth itself and evaluate scientific background of new approach .

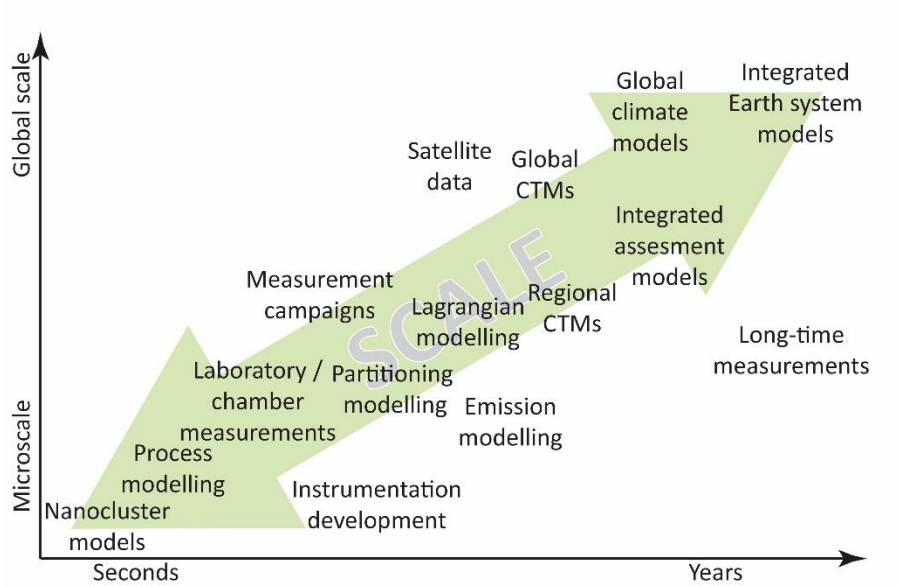

Figure 1. Examples of the temporal and spatial scales of modeling and observations within the PEEX (Kulmala et al. 2009).

DIGITAL EARTH AS A FRAMEWORK FOR PEEX: THEORETICAL ASPECT

Geoservice Google Earth, opened in 2005, was the first obvious example of the implementation of the concept of Digital Earth, foreseen by US vice-president Al Gore a decade earlier [Gore, 1998]. New product turned out to be extremely innovative, therefore its relationship with cartography raised questions. It has been suggested the emergence of a new class of geospatial applications that are qualitatively different from the previous one - maps and GIS. It is widely believed that Google Earth is a summa of new technologies, not a new science.

International Society for Digital Earth (ISDE) defines Digital Earth as a 'global and interdisciplinary initiative to construct a comprehensive virtual representation of the planet' [ISDE 2006]. This definition emphasizes social aspect of the phenomenon, however, hides the question of the presence of scientific novelty.

Obviously, Digital Earth differs essentially from mapping products, like GIS, but relations between cartography and Digital Earth remains controversial and discussable. On the one hand, Digital Earth is deeply rooted in classical cartography and belongs to same domain area. On the other hand, new approach dramatically contradicts basic principles of mapping. For example, Digital Earth is completely avoiding map projections [Goodchild et al., 2012], so it is not a cartographic product. To a certain extent Digital Earth is 'impossible object' for classical cartography, because it combines global coverage with topographic accuracy for whole Globe; it is impossible in classical cartography. It means Digital Earth is a not a map or map-like product in classic terms, and we need a classification model for different geospatial products.

First attempt to provide a new classification of different geospatial products was made by Andrew Turner [Turner, 2006]. He combined the variety of new geospatial products, including Google Earth, into new genus, or realm, called 'neogeography'. This new genus was located 'outside the realm of traditional GIS, Geographic Information Systems' (Fig. 2). Also he defines neogeography as a generic term for very broad range of new products and 'set of techniques and tools'. However, the proposed definition of neogeography is not shed light on the nature of the neogeography itself and does not provide clear and useful criterion of classification.

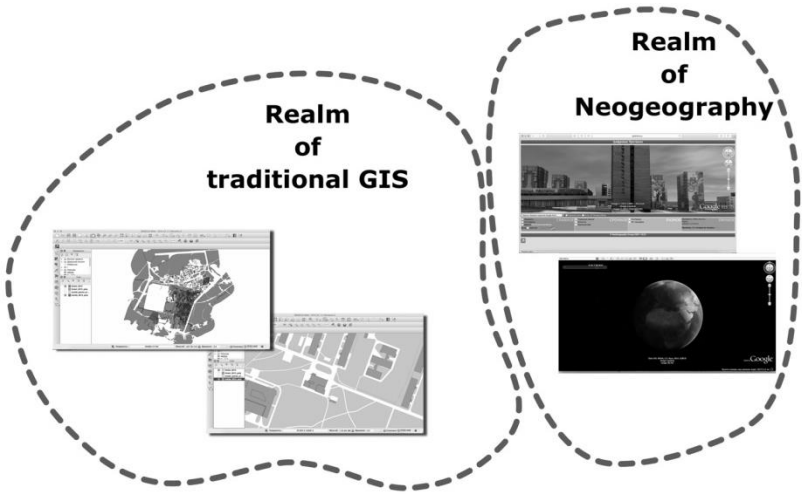

Figure 2. Representation of two geospatial realms by Andrew Turner's definition of neogeography

Really, neogeography is a 'set of techniques and tools'; but it is not mean that neogeography is only set of techniques and tools and nothing else. Moreover, it is not mean that 'set of techniques and tools' is the necessary and sufficient condition for separating neogeography from ordinary maps and GIS. Intentional definition that provide set of necessary and sufficient conditions for differentiation between common cartography method, from one side, and neogeography, from another side, is highly demanded.

Core concept and main feature that separate Digital Earth (Google Earth) from classical map and GIS is an providing of multiscaling, or multiresolution, prohibited by the rules of cartography. This feature is most closely corresponding to concept of situational awareness, that emphasize 'the perception of elements in the environment within a volume of time and space' as a *sine qua non* condition for representation of complex dynamic processes in real world [Endsley, 1995].

Multi-resolution representation with same dataset for different scales is unachievable by the means of ordinary cartography, because of inevitable fragmentation of dataset into dissimilar scale-dependent replicas. Unique real world is inevitably broken down onto different models for different scales as a consequence of generalization, so direct interchange of geographical context and user data embed in this context between maps of different scales becomes impossible. It means maps and map-based products could not provide situational awareness.

Situational awareness principle strongly demands integration of 'vast quantities of geo-referenced data' into the same volume of space and time regardless of scale. In other words, situational awareness requires same geospatial context and same dataset for all scales. It is unachievable in classical cartography as a matter of principle, but Google Earth, as implementation of Digital Earth concept, meets this demand. It means Google Earth contradicts classical cartography principle. For understanding basic differences between cartography and Digital Earth we should provide classification of the variety of modern geospatial solutions.

USING OF DIGITAL EARTH FOR PEEX PROJECT

Success of PEEX as multiscal and multidisciplinary intitative depends on a quality of seamless integration of data from different scales. A particular problem is an aggregation of local data without loss of quality and accuracy

in the same global 'volume of time and space'. Local environmental data is an important source of information, because these data reveals most significant factors of pollutions. Also, we can predict a significant variability of environmental parameters within urban areas.

For accessing the efficiency of aggregating of different PEEX-related data with high accuracy the project 'Digital Protvino' can be used. Protvino is a small (near 40 ths. Inhabitants) town in Moscow Region, Russia. Digital Protvino (DE) is an intitative for creating municipal-level situational awareness by the means of neogeography tools with the help of aggregating heterogeneous data – social, ecological, medical, industrial, etc. The core of the project is a photorealistic 3D-model of a town buildings. This model is created and actualized for providing context-rich as a geographical framework for fast locating of data and providing situational awareness for decision making. Also, local information represented in the global geographical context could be seamlessly aggregating within continent-wide and global-wide information systems for providing scale-independent representation of dynamic processes.

Project Digital Protvino is accessible in the Internet (http://www.VProtvino.ru). Geographical context of the municipality is represented by the means of Google Earth API. Now the project covers the territory of Protvino municipality and aggregate different types of data:

- satellite imagery;
- 3D-models of buildings;
- social, business, transport, industrial infrastructures and POI;
- spherical panoramas;
- ecological data (in 4D-format);
- emergencies (in 4D-format).

Represented data is related to 2010-2011. It is possible to control 3D (spatial) and temporal dynamics interactively by the means of standard interface controls of Google Earth API. Heterogeneous dataset is integrated seamlessly within global context. Any data could be added in the project in the form of KML or KMZ files.

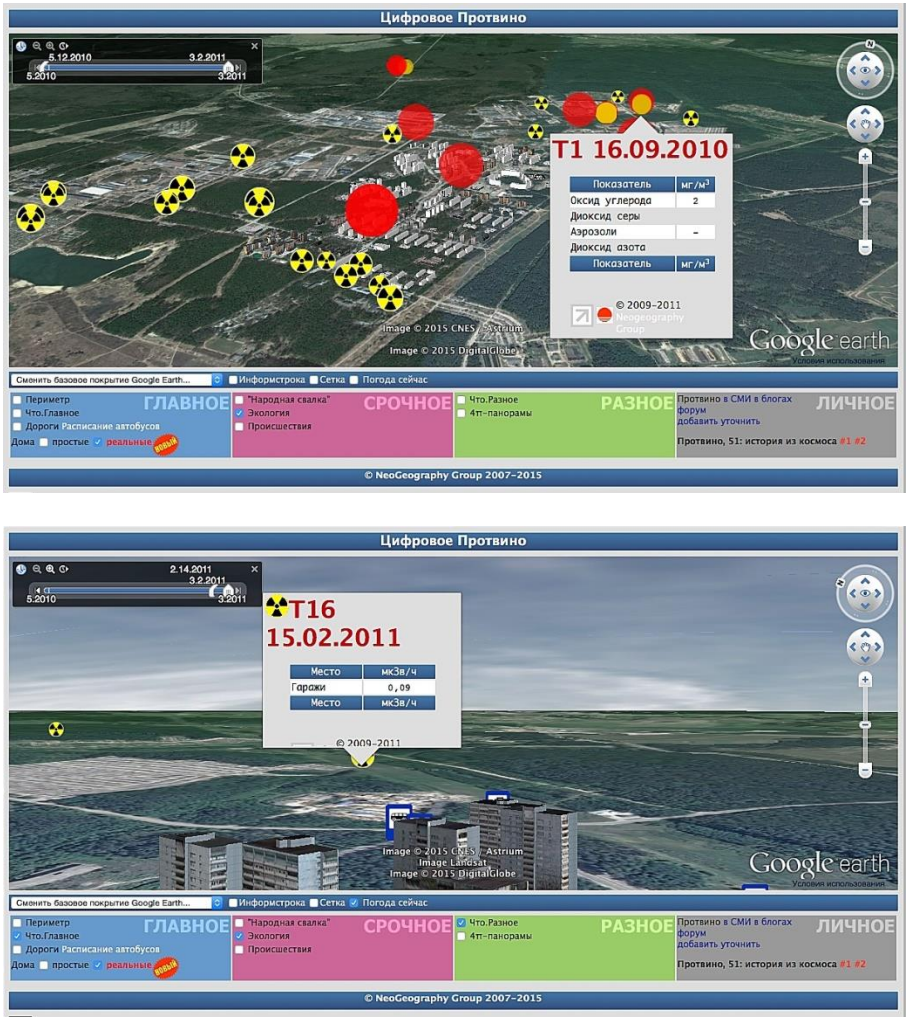

Figure 3, 4. Representation of environmental and ecological data in the Digital Protvino project.

Usually wide-scale aggregation of ecological and environmental data is provided by the means of two-dimensional geoportals. Using of Digital Earth approach seems more useful, because we can represent vertical distribution of parameters, especially in dense urban areas.

CONCLUSIONS

PEEX project as a global initiative for solving interlinked global challenges demands effective framework for aggregation data of different scales within same geospatial framework. Digital Earth is a most comprehensive approach up to date. Local initiative like Digital Protvino could be aggregated within PEEX project seamless and could provide significant information for the project.

ACKNOWLEDGMENT

The study was supported by grant of the Russian Science Foundation (project №15-17-30009).

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APPLYING 3D CADASTRE ELEMENTS IN DEFINING BUILDING'S COMMON SPACES IN PRISHTINA

Fisnik LOSHI[1]

SUMMARY

The purpose of this paper is to give a short overview of the model developed regarding common spaces record for the condominiums in urban area of Prishtina. The proposed model developed from the author of this article aimed to adopt 3D cadastre requirements and techniques for common spaces registration. The techniques adopted within project represent one of the first steps towards 3D cadastre in Republic of Kosovo.

Key words: 3D cadastre, Building's Common Space, Building Cadastre, MCO, Database

INTRODUCTION

During 2008/09 and after during 2012/13 a project named Building Cadastre has been finished in Kosovo. The purpose of this project was to create a register of Buildings and Parts of the Buildings as cadastral units according to the Law (Law no. 04-L/013). As the result of this project all condominiums in Prishtina were registered and property certificate was issued for the owners who succeeded to prove their ownership on parts of the buildings. In total 24606 parts of the buildings/apartments were registered only in urban area of Prishtina (GeoProject, 2011). But as every new development Building Cadastre Project has its own weaknesses! Building cadastre project was focused in defining and registering the apartment ownership but it failed to measure and register common areas. Faced by this problem Cadastral Office within Prishtina Municipality (MCO) initiated a pilot project named "surveying of common building's spaces in Prishtina" which aims to measure and to create a register for all the common areas.

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The concept of 2D area is more and more seen as "3D space" due to 3D cadastre developments throughout the world (STOTER, 2004); therefore, the company selected to fulfill this task and based on the project title where the word used was "Space" saw this as a good opportunity to introduce some elements of 3D cadastre since the law does not have any restriction on this. They have developed a model and presented it to the experts from MCO. This model was accepted and as a result the project was done based on this idea with few changes during the process.

The aim of this article is to give an overview how the pilot project was performed and valuating the final results and give in the end recommendations. As result from the pilot project a database model was developed accompained with a graphical design model.

SURVEYING BUILDING'S COMMON SPACES IN PRISHTINA

Within the project, the Municipality of Prishtina wants to determine all the common areas within the buildings. Those properties can be classified as "everybody's and nobody's property". This project can be considered as fulfillment of the project finished from Kosovo Cadastral Agency in 2012 where a register of parts of the buildings was created and from then for all the owners of appartmens in Prishtina an ownership certificate was issued. The previous project was mostly based on papers and contracts shown by the owners of the parts of the buildings/apartments within condominiums. The common areas within those affected condominiums where not specified in graphical data nor where mentioned in any way in textual data/registers. Therefore, the Cadastral Office within the Prishtina Municipality (MCO) was faced with cases where some more specific information was needed regarding common spaces. The idea for measuring and registering common properties came by the experts working in MCO even that technical aspects where not known yet.

REQUIREMENTS FROM CONTRACTING AUTHORITY

The contracting authority made clear briefly the importance of the information streaming from this project for the municipality. Also defined the laws and regulations issued by different authorities which should be taken into consideration. Since there was no model how the data collected on the field should be arranged the contracting authority has left this opportunity open for the contractor to propose a solution. All what was defined was the format for data delivery (MCO, Tender dossier, 2015).

THE PROPOSAL FOR PROJECT DEVELOPMENT

The company which has won the tender gave a proposal how this project should be finished. The idea was based on elements from 3D cadastre and this way we can consider that this is a first step towards 3D cadastre in Republic of Kosovo.

The list of areas defined as common properties and which should be covered is given by the master plan delivered and approved by MCO. Therefore, the areas of the buildings covered by the project and considered as common properties are:

a) Entrances and hallways of the condominiums,
b) Spaces used for stairs,
c) Spaces used for elevators,
d) In front platforms dedicated for public usage,
e) Common areas inside the building used for parking,
f) Warehouses used for common purposes,
g) Common areas used for waste collection within the condominiums,
h) Structures used for building connection and Flat and non-flat roofs (Law no. 04/L-134).

Fig. 1. Types of common properties. A – structure used for building connection, B – platform, C – parking area, D – stairs.

A register for common properties was proposed as well. The idea was to use the existing code which was given for each of the buildings by "Building Cadastre" project and add some more codes in order to identify the common properties and their usage destination. Figure 2 shows a sketch taken from Building cadastre and the unique code for the building.

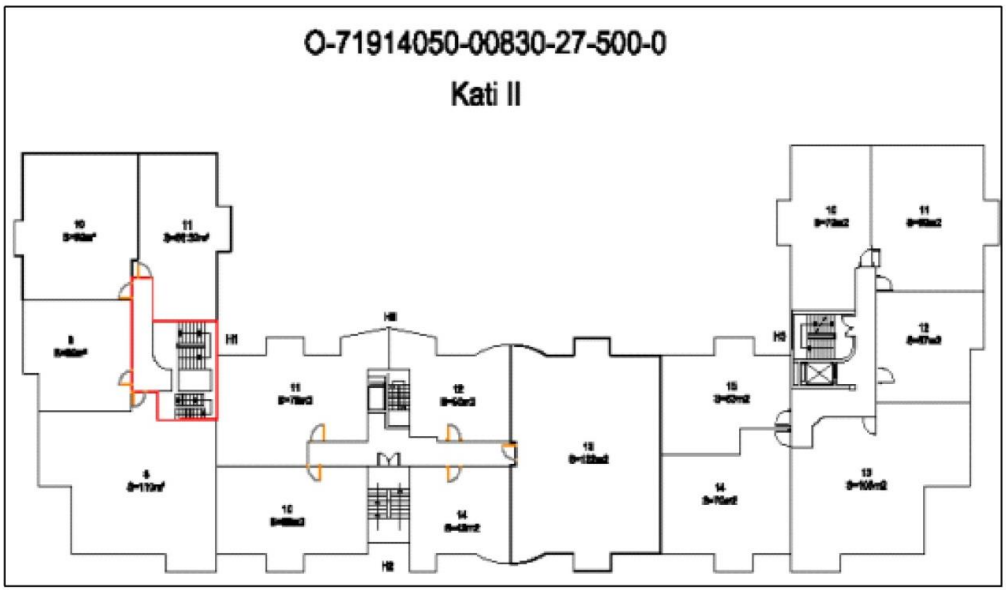

Fig. 2. The unique code and a sketch from building cadastre (Meha et al, 2013)

After consultations with MCO it was decided that the unique code for each common property should be as described below:

"Cadastral Zone" – "Parcel Number" – "Building Number" – "Common Property Code"

The "Common Property Code" should be: **HPn-E-No** and where:

HP – means Common Property,

n – tells the floor,

E – is the entrance number and finally

No - is a number which starts from 1 and ends depending on the number of the common areas within one building.

Also it was suggested and approved that the textual data collected on the field should be archived in a register which should be in excel and access format. The first part of this register was taken from the building cadastre respectively from "the data for the building" and the second part of the register was created exclusively for this project ("News" LTD, 2015).

NO	Municipality	Cadastral Zone	Building Number	Address of Building	Place name	Area [m²]	Unique No of common property	Actual Use	Floor Number	Area of C.P.	Unit Status	Owner	Remarks
1	Prishtinë	Prishtinë									C P	Common property of the owners of parts of the buildings	

Table 1. The attribute table for registering common properties.

The data archived on the above table are also connected in graphical data as attributes for the features.
In Building Cadastre, for registration of buildings and parts of the buildings the needed information is: mortgages, numbers and addresses for the buildings, buildings already registered in cadastre and the linkadge between the buildings and parcels (Meha and Buschhoff, 2011). The same principle was used also for common property registration.

DATA COLLECTION

The data on the field were collected using classical instruments as Total Station and Distance measurements devices. The footprints of the buildings together with corner points on the roof were measured by Total Station and inside distances including floor heights were measured with distance measurements devices. Also pictures were done for all the buildings - outside and inside areas. This information was considered sufficient for the purpose of the project. Measuring buildings, as one of the cadastral units, with geodetic devices in Republic of Kosovo means that the point measurement should not exceed the accuracy of $\sigma = +/- 3$ cm and with an allowed error of $\Delta = +-2\sigma$ (Guideline no. KCA 2013/02). The author of this article who is in the same time the creator of this model, helped by experts of the company selected to implement this pilot project, has tested and concluded that this measuring technique keeps the errors inside the accuracy limitations.
All the data collected in the field was archived in digital and manual folders. The manual files where sketches prepared specially for this topic and we found that they were very useful materials.

DATA MODELLING

The digital model was constructed using the software Civil 3D version 2012. All the information collected on the field was digitized and modelled in 3D. The textual data or attributes were systemized in a database created in access format and then the attribute table was uploaded into the cad format file. As final result we have created a file which contains and integrates both graphical and textual data.

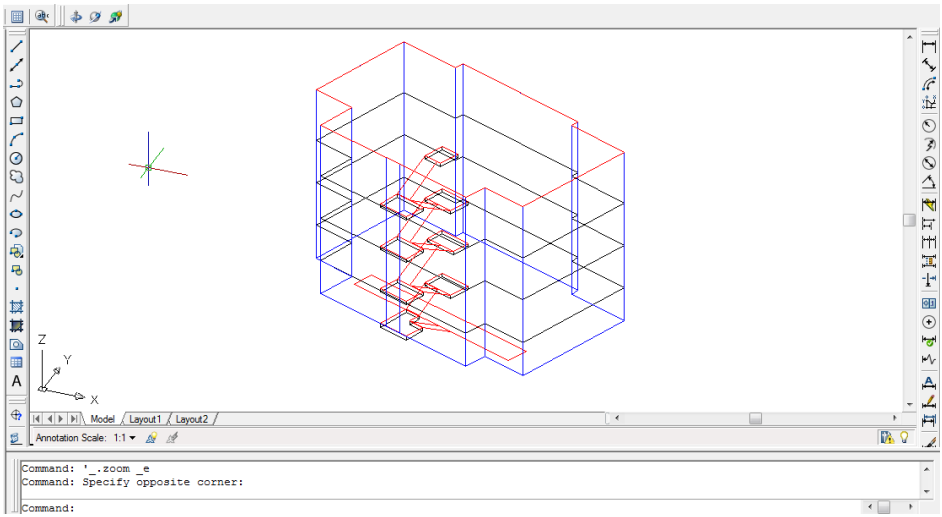

Fig.3. Identification of common properties within one of the buildings.

As it is obvious in the picture above the graphical data file contains the footprints of the buildings and the heights measured on the field by geodetic equipments. Inside the building the common areas are modelled and their position in the building represents their realistic position of the field. The inside area of the buildings was measured using simple equipments such as distance measuring equipments. Photo cameras were applied as well in order to bring a clear view in the office and this was found out to be very usseful. In figure 3 the red color represents the common areas while the blue one represents the outside area and the shape of the building.

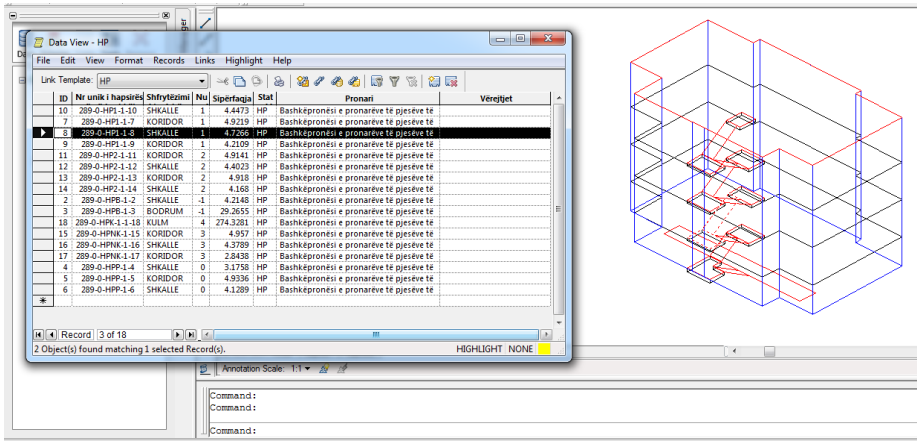

Fig.4. The attribute table attached to the graphical data.

Figure 4 shows the incorporation between the graphical CAD file and the access attribute table where the textual data are archived. It is important to state out that there are two different layers created and one attribute table for each of the layers. The first layer contains the footprints and shape of the buildings associated with an attribute table containing the data already existing in Building Cadastre. The second layer contains the boundaries and graphical information for common properties. This layer is linked to an ACCESS database which contains textual information such as area, type of use, unique number etc regarding common properties.

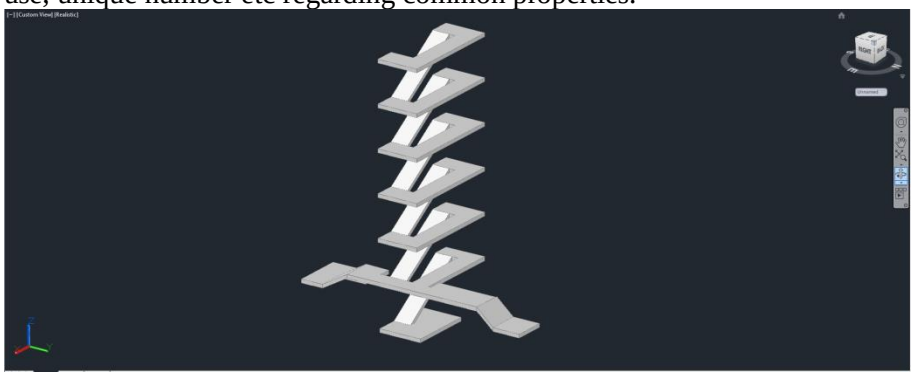

Fig. 5. Modelling common properties for condominiums.

STATISTICS

The project initiated from Municipality of Prishtina aims to create the guidelines and test the registration of common properties for all

condominiums in urban area of Prishtina. Therefore the above described project can be considered more as a pilot project.

In total within Building Cadastre Project in Prishtina are registered around 976 (Geoproject, 2011) condominiums/buildings. The number of new condominiums constructed within urban area of Prishtina is around 50 per year (Gazeta Zëri, 2015). Therefore we can conclude that we have in total 1200 buildings/condominiums inside urban area of Prishtina. Within this project are covered around 136 buildings and with a total of 172 000 m² of common properties. Therefore we can say that the pilot project covered around 11% of the common properties within the buildings in urban area of Prishtina.

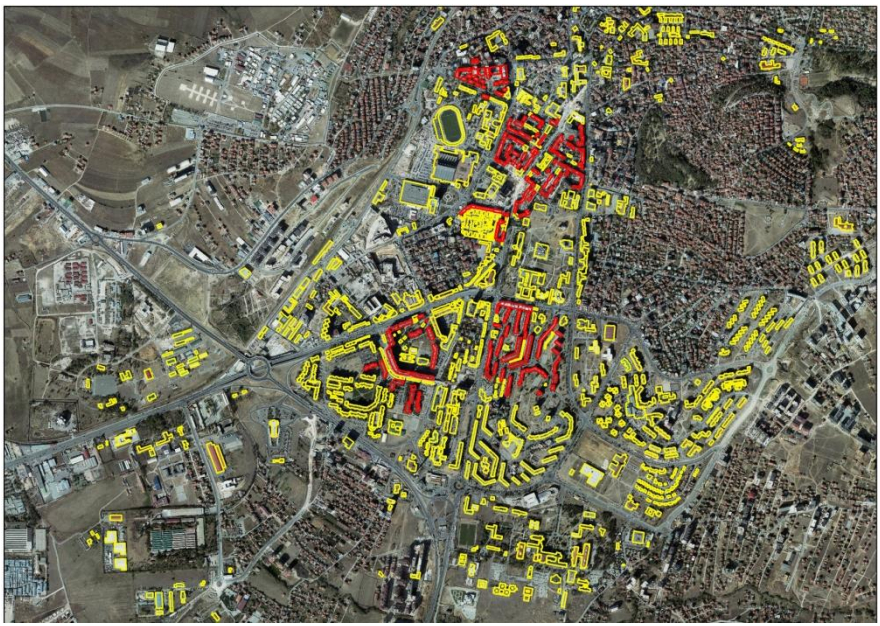

Fig. 6. Buildings of Prishtina registered in cadastre

In figure 6 the yellow color shows the buildings of Prishtina which already are registered in cadastre while the red color shows those that are covered by the pilot project of registering common spaces.

OUTLOOK AND RECOMMENDATIONS

Even that the law on 3D cadastre in Kosovo is far away from being a reality, this project gives an example of 3D cadastral elements and the way it was finished doesn't affect any of the Laws or regulations in power.

As final result from this article we can even give few recommendations:

- The final data model designed within this project, very easy can be adopted for 3D cadastre in a near future as they represent a good 3D basis for sketching parts of the buildings,
- Kosovo Cadastral Agency, as responsible institution for geodesy and cadastre in Republic of Kosovo, should start thinking towards developing the legal framework allowing and regulating 3D cadastre as a necessity of time and in the same time start to experiment 3D cadastre from technical point of view.
- The database and graphical design should be developed using a professional format and in the same time try to be close to the formats used from cadastral authorities in Republic of Kosovo.

Based on this pilot project and discussions with experts of the field we can say that 3D and 4D Cadastre is not anymore an unknown concept in Kosovo and independent experiments were already performed. Despite the lack of legal framework in Republic of Kosovo regarding 3D cadastre, starting from this pilot project, we can say that Kosovo soon will join the group of 30 countries which are performing experiments and researches towards 3D and 4D Cadastre (Rajabifard, 2014).

The necessity for 3D cadastre is growing day by day as the need for geo-information became part of everybody's everyday life.

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CONFLICT AND POST-CONFLICT CONTEXTS IN RELATION TO LAND, OTHER RESOURCES AND LAND ADMINISTRATION

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SUMMARY

Conflict and land are tied in a complex relation. This relation has various characteristics before, during the armed conflict, and in post-conflict contexts. Land and other resources are many times seen as factors for eruption of violent conflicts, in some circumstances influence the duration and give specific characteristics to the conflict. Land issues play a particular role in the post-conflict contexts. Land was identified as a critical gap in international response capacities and the awareness about the vital importance of addressing the housing, land and property issues within the context of post-conflict state building has increased. This paper, based on literature review, explores the conflicts and post-conflict contexts in relation to land, other resources and land administration. At the end, this paper acknowledges the importance of land and its administration in post-conflict contexts as one of the essential elements in the process of post-conflict state building.

Key words: Conflict, post-conflict contexts, land, natural resources, land administration, post-conflict land administration.

1 INTRODUCTION

Causes of violent conflicts are many and varied; in some cases land is a major cause. Land was identified as a critical gap in international response capacities (OCHA, 2005). Awareness about the importance of addressing the

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housing, land and property (HLP) issues in the emergency and early recovery period has increased in the last 15 years. On the other hand, experiences show that there are only a few cases where land issues were appropriately addressed in the post-conflict contexts. Humanitarian organizations in this period mainly focused on internally displaced persons (IDPs), refugees and restoring the situation as it was before the conflict.

There is increasing number of literature about the topic of land issues in post-conflict context, basically on: what to do about land, land management and land administration in post-conflict contexts (EU-UN, 2012; FAO, 2005; Pantuliano, 2009; UN-HABITAT, 2007, 2009). Although the awareness about the importance of land and other resources in post-conflict contexts has increased within the international community, actors involved with the topic are underlining the need that more in depth research in this specific area is required which should be evidence based.

Recognizing the important role that land is playing within the conflict and post-conflict contexts goes in the alignment of the goal of this research paper: to increase the understanding about the conflict and post-conflict contexts in relation to land, other resources and land administration.

The paper starts with identifying the role of land in conflicts and post-conflict contexts. It continues with exploring, other resources and land administration in conflict and post-conflict contexts. It ends with conclusions about the conflict and post conflict contexts in relation to land, and about the potential that land administration has for post-conflict contexts.

2 LAND IN CONFLICT AND POST-CONFLICT CONTEXTS

As described in UN/ECE (2005) land can be recognized as a source of all wealth. Land is a place of all shelter, in the city, the town, the village, and at home. It is the source of food, of materials for construction and manufacture, of coal, gas and oil, of springs and rivers and other essentials for life. Indestructible, immovable, it is the foundation of all human activities. Houses and factories, forests and farms, river roads and railways, mines, quarries, and reservoirs are all fashioned from the land. It offers endless opportunities for development and discovery. From land administration perspective ‘Land’ is to be considered as the surface of the earth, the materials beneath, the air above, and all things fixed to the soil, so it is more than just ‘land’ alone: it includes buildings, etc. (van der Molen, 2002). ‘Recognizing that land is a source of wealth lies at the heart of good government and effective public administration’ (UN/ECE, 2005).

Historically observing, wars were fought over land. In some cases land was one of the factors and sometimes land was a major cause for the conflict.

Therefore, Putzel (2009) argue that causes of conflicts are not because of the land only, but they always have a land dimension. Land is often a significant factor for widespread violence and also a critical element in peace-building and reconstruction in post-conflict situations (USAID, 2005).

The most serious concerns from the armed conflicts are: people killed, destroyed infrastructure and houses and displaced population. Where, displacement is becoming an alarming issue for the states in conflict, neighbouring states, UN and international community (Hollingsworth, 2014; Takeuchi et al., 2014). During the conflict people experience forced eviction. Displaced people often settle on land to which they have no legal claim. There is also an issue that remaining citizens occupy land and houses left by refugees/IDPs, this type of occupation is called secondary occupation. There is an important legal distinction between refugees and IDPs. Refugees are people who flee their homes for the safety of another country. IDPs are people who flee from violence but remain within their own country (FAO, 2005). The right of all refugees and IDPs to return to their homes and places of habitual residence in their country and/or place of origin is defined in relevant international legal instruments (UN, 1998). The period after the end of a conflict is critical because of the possibility of return of displaced population in large numbers and in short time period, here, the land-related challenges arouses on horizon and a possibility for renewed violent conflict (UN, 1999).

Armed conflicts usually end with signing a peace agreement described as: 'a formal agreement between warring parties, which addresses disputed incompatibility, either by settling all or part of it, or by clearly outlining a process for how the warring parties plan to regulate the incompatibility' (UU-DPCR, 2012). Experiences show that land issues are not always included in the peace agreements. De Wit in the HPG (2008) underlines that there is a need to ensure land issues are tackled in peace agreements and that this includes adequate follow-up; making references to land can be important (even in fragile contexts) as it puts pressure for the issue not to be dropped off the political agenda.

The role of land and other resources, natural resources for example, in conflict and post-conflict period is attracting international attention. Land and natural resources often contribute to conflict and are affected by conflict (J. Unruh and Williams, 2013). The changing nature of violent conflict combined with long-term demographic, economic and environmental trends present significant practical challenges for global peace and security (EU-UN, 2012). In the following sections first natural and other resources are observed in regards of their impact on the eruption of conflicts, during the conflict and their role in the post-conflict period. Then, land-related issues,

more specifically land administration in the conflict and post-conflict contexts are explored more in depth.

3 NATURAL AND OTHER RESOURCES IN CONFLICT AND POST-CONFLICT CONTEXTS

Since the late 1990s, many scholars have studied the relationship between natural resource wealth and conflicts. Most have been motivated by a series of high-profile conflicts – cases like Angola, Colombia, the Democratic Republic of Congo, Liberia, Sierra Leone, and Sudan – that have captured the attention of both international organizations and the media. These studies tell us about the relationship between natural resources – including oil, gas, non-fuel minerals, gemstones, narcotics, timber, and agricultural products – and violent conflict (Ross, 2004).

Resources not only financed, but in some cases motivated conflicts, and shaped strategies of power based on the commercialization of armed conflict and the territory of sovereignty around valuable resource areas and trading networks. Natural resources have played a conspicuous role in the history of armed conflicts (Le Billon, 2001). From competition over wild game to merchant capital and imperialist wars over precious minerals, natural resources have motivated or financed the violent activities of many different types of belligerents (Westing, 1986).

Armed conflicts and natural resources can be directly related in two main ways: armed conflicts motivated by the control of resources, and resources integrated into the financing of armed conflicts. Although few wars are initially motivated by conflict over the control of resources, many integrate resources into their political economy. Beyond motivating or financing conflicts, the level of dependence, conflictuality, and lootability of a resource can also increase the vulnerability of societies and the risk of armed conflict (Le Billon, 2001).

Several case studies from African (and Central Asian) civil wars have shown the complex political economy of resource exploitation, armed struggle and oligopolistic regimes of resource exploitation, especially when high-value resources such as oil or diamonds are available (Korf and Funfgeld, 2006).

Ross (2004) analysed the following five resource-conflict relationship:

• whether or not natural resources influence the onset of conflict;
• whether or not resources influence the duration of conflict;
• whether resources influence all types of civil wars or only a subtype, e.g. ethnic or separatist conflicts;
• whether all types of resources, or only a subset (e.g. oil, diamonds) are linked to conflict; and

• what causal mechanisms link resources to conflict.

He was using the results from the research collected in the period of five years; the weight of the evidence available so far suggests four regularities:

(1) oil dependence appears to be linked to the initiation of conflict, but not conflict duration, there is some evidence that oil dependence (and possibly mineral dependence) is more strongly associated with separatist conflicts than other types of conflicts;

(2) gemstones, opium, coca, and cannabis do not seem to be linked to the initiation of conflict, but they do seem to lengthen pre-existing wars, timber's role remains untested;

(3) there is no statistical evidence – and very little case study evidence – that links agricultural commodities to either the initiation or the duration of civil war;

(4) the claim that primary commodities are associated with the onset of civil war does not appear to be robust.

Ross (2004) argues that research on resources and conflict has developed remarkably fast; almost all of the studies described here have been carried out since the 1998 publication of Collier & Hoeffler's seminal article. (Collier and Heoffler, 1998) investigated whether conflicts have economic cause in a utility model with four variables: initial income, ethno-linguistic fractionalisation, the amount of natural resources, and initial population size. Recommendation from Ross (2004) at the end is that if scholars wish to produce research that contributes to better policies, they must think carefully about testing their ideas; sharing data; speaking a common conceptual language; and drawing together the findings of disparate research projects – both qualitative and quantitative.

Recent studies have shown that conflicts associated with natural resources are twice as likely to relapse into conflict within first five years after the end of hostilities (UNEP, 2009).

As a summary, natural resources can have influence as a cause of conflict, to the duration of the conflict, they play specific role in the post-conflict period. If adequately managed, they could contribute to the post-conflict economic development of the particular state and to the overall post-conflict state building.

3.1 Resources scarcity as a risk factor for possible violence/conflict

According to advocates of the *scarce resource wars* hypothesis, people or nations will fight each other to secure access to the resources necessary for their survival: the more scarce the resource, the more bitter the fight (Homer-Dixon, 1999; Peluso and Watts, 2001).

The link between scarce resources and conflict is contested in general (de Soysa, 2002). Several scholars argue that scarce resources should be more relevant in generating smaller more local conflicts than civil or intrastate wars (Barnett, 2001). The researchers in this field developed Malthusian concept or frame by linking resource scarcity with violence (Korf and Funfgeld, 2006).

In the literature on the nexus of resources and violent conflict, two broad lines of thinking can be distinguished. Both have in common that they essentialise a kind of resource curse. The first one works in a neo-Malthusian conception that links population growth with increasing resource scarcity and related environmental problems, which translates into triggers for violent conflict (Homer-Dixon, 1999). The second school of thought links violent conflict with resource abundance rather than scarcity. This argument stresses the opportunities to monopolize resource rents through violence in 'greed '- driven warfare (Collier, 2000).

3.2 Effects of 'Climate Change' and conflicts

The phenomenon of climate change has been researched with focus on how it could be related with violent conflicts. The evidence of coming climate change has generated catastrophe-like statements of a future where a warmer, wetter, and wilder climate leads to a surge in migrant streams and gives rise to new wars (Theisen, 2012).

Statements like: 'the threat from climate change is serious, it is urgent, and it is growing. More frequent drought and crop failures breed hunger and conflict are expected' (Obama, 2009) but also many scholars (e.g. (de Soysa, 2002; Peluso and Watts, 2001) with their arguments posit a clear link between resource scarcity and conflict. From the climate change expected effects could be draughts, floods and more nature caused disasters.

Research in this area proved that climatic factors do influence the risk of conflicts and violent events. Research performed by Theisen (2012) comes to findings which indicate that relatively dry years tend to have a peaceful effect on the following year. Little support is found for the notion that scarcity of farmland fuels violence in itself or in election years, but an election by itself increases risk. More densely populated areas run a higher risk of conflict, but this is not due to pressure on cropland; rather, it is likely to be driven by other mechanisms that put densely populated areas at risk. Taking a longer-term perspective, (Witsenburg and Adano, 2009) analyse the Marsabit district in Kenya and find that wetter years see on average more than twice as many killed than do drier years.

Theisen's summary of the result from his research are as following: climatic factors do influence the risk of conflict and conflict events, quite strong

evidence for years following wetter years being less safe than drier years, the thesis that land scarcity breeds violence in itself and in election years receives little support, although population density per se is found to increase conflict risk. Other conflict influence factors: political marginalization (spill over of civil conflicts, or hideouts for criminal elements) and ethnics manipulation (Theisen, 2012).

3.3 Other issues in relation with conflicts and post-conflict contexts

An issue of Journal of Agrarian Change on violence and war seeks to bring agrarian relations back into the analytics of armed conflict (Cramer and Richards, 2011). This is important as it grounds war in structural and material interests, and makes it less of a capricious, anarchist, 'cultural' phenomenon (Le Billon, 2001; Peluso and Watts, 2001).

Agrarian history has led to expect violence in land reform struggles and over the unnatural division of tropical landscapes into discrete agriculture and forest zones; these are taking new forms with changes in forest cover, agricultural production and practice, and the land control dimensions of forestry, agro-forestry, and agriculture (Peluso and Lund, 2011).

Political ecology is the study of the relationships between political, economic and social factors with environmental issues and changes. Political ecology has rarely examined the relationship between the environment and a core concern of traditional political science, namely regime security and armed conflict, focusing on social conflicts over forest resources, protected areas, agricultural regimes, or productive regions; yet neglecting large-scale violent conflicts (Le Billon, 2001).

The point in a summary is that resources are key to the 'sustainability' of violent conflicts (Daudelin, 2003).

3.4 Land-related issues in conflict and post-conflict contexts

During the conflict people are killed, infrastructure and houses are destroyed and masses of people are being displaced. Destruction and displacement have big influence on land and property related issues during and specifically in aftermath of the conflict (Hollingsworth, 2014).

One of the immediate and frequent land-related problems in post-conflict contexts, leading to confusion in regard of variety of legal and administrative issues is legal ambiguity. Where, usually the following situations are present: unclear rights of access and use land and properties, confusion about which institutions govern land, disputes related to individual ownership and land, and overlapping, incomplete inconsistent and outdated land policies (J. Unruh and Williams, 2013).

Legal pluralism is another feature of post-conflict contexts, here, different types of laws regulating ownership or rights to use land and property (including *ad hoc*, customary, religious, and statutory - often localized) coexist and function in parallel. Governmental capacities and structure are often weak and fragmented, in regard of which ministry or authority has mandate to enforce higher mentioned laws. Establishing (or re-establishing) tenure security can be very complicated in countries emerging from years of conflict, especially where land records are not available or are badly organized, and where statutory and customary systems overlap (Fitzpatrick, 2008).

A small number of professionals with background in land and property related issues are engaged in the topic of conflict, and are especially needed in post-conflict contexts. This specific environment requires engagement of different actors to come and work together in the early stages of the post-conflict period. Pantuliano in HPG (2008), underlining the critical importance that land issues play in conflict and post-conflict contexts, stresses the identified need to bring land tenure expertise to the humanitarian community (HPG, 2008).

At the end of conflict, masses of displaced population returns back to their places of origin. With their return, a host of land-related problems arise on the horizon and returning population usually face: illegal occupation of their properties by local commanders, disputes arising from the loss and destruction of ownership documents, fraudulent transactions, land distribution by successive governments to their political supporters, and disputes over grazing and water rights (Guterras, 2009).

Disputes over land are often an underlying cause of, and factor in, conflict, especially in protracted crises. Land dispute resolution mechanisms are viewed as a conditional tool for a good peace process as well (J. Unruh, 2001). It is important that land claims and grievances be addressed promptly at the end of a conflict. If these issues are overlooked, property disputes will inevitably escalate and may risk threatening the usually fragile stability of a post-conflict transition. The increase in land and property disputes in the post-conflict period usually stems from the failure to understand or constructively manage post-conflict land and property relations. This has important implications for return, recovery and reintegration processes (Pantuliano, 2009).

Daudelin (2003) developed an analytical framework that would help assess the correlation of land policies and conflict's. The framework addresses issues regarding the: access to land, security of tenure and distribution of land which are addressed within the particular land policy of one state. Conclusion from this research is that 'land policy can make things worse or better but it is only exceptionally a critical factor of conflict, even in the

countries and societies where the vast majority of the population depends on agriculture for its survival, and even countries coming out of war'.

Despite increasing evidence that land is often a critical issue in conflict-affected emergencies and forced displacement and plays a key role in post-conflict reintegration and reconstruction processes, there is a perceived lack of humanitarian engagement on HLP issues. Emergency measures such as creation of IDP camps and other settlements are de facto interventions in land management and land tenure (de Waal, 2009). Acting on land issues in post-conflict contexts is of crucial importance in order to support a peaceful transition after the conflict. The management of land relations is intrinsically linked to a range of peace benefits (Cramer and Weeks, 2002).

Future about conflicts: Looking to the future, it is difficult to avoid the disturbing conclusion that the issue of land, conflict and humanitarian action will need a more prominent place on the international agenda. An accumulation of adverse trends – economic downturn, the process of climate change, volatile food and energy prices – appear likely to create the conditions for conflict within and between states, some of them directly related to the struggle for land, water and other scarce resources (Guterras, 2009).

4 LAND ADMINISTRATION IN POST-CONFLICT CONTEXTS

Recognizing the important role that land is playing within the conflict and post-conflict period, drives this research to explore the existing literature how the land is managed and administered in these circumstances, that is the aim of this sub-section: to increase the understanding on the role of land administration in post-conflict contexts.

Land Administration: The term land administration has been introduced in the 1990's and has probably the first time been given 'official' status by the UN/ECE Working Party on Land Administration (WPLA) in 1996 (Steudler, 2004). According to the UN/ECE web site, the aim of WPLA is the promotion and improvement of land administration and land management at supporting security tenure, improving and creating more effective registers and promotion of sustainable land use policies (UN/ECE, 2015). The importance of effective land administration in support of good governance and economic development is well recognized internationally (Groot and van der molen, 2000).

The UN/ECE Land Administration Guidelines defines land administration as 'the process of determining, recording and dissemination information about tenure, value and use of land when implementing land management policies' (UN/ECE, 1996).

Land administration deals with ownership, use and value of land (Zevenbergen, 2002). Cadastres have registered the human terrain for centuries (Batson, 2008). 'Ownership' is to be seen in a broad sense: as land tenure, that is the mode in which rights to land are held, based on statutory law, common law, and customary traditions. 'Value' is to be understood as all kinds of values which land might have, depending on the purpose of the valuation, the use of the land and the method of valuation. 'Land use' is to be understood as all the kinds of use land might have, depending on purpose and use, classification and methodology (van der Molen, 2002).
The definition for the land administration from UN/ECE (1996) has been used in many policy documents and research studies, in this research it is the key guiding principle as well.

4.1 Land administration in post-conflict contexts

The situation in regard of housing and property rights and land administration in post-conflict contexts is difficult and multidimensional. Many of those conflicts have direct effect on the control over land and the rights of people relating to land and cause innumerable denials of HLP rights (Tibaijuka, 2007). Therefore, it is not possible to develop guidelines for all aspects for all countries and scenarios simultaneously, and addressing housing and property rights and land administration in such contexts requires an approach that copes with the local circumstances (van der Molen and Lemmen, 2004). Some of the land challenges that arise in post-conflict situations include: loss or destruction of property, secondary occupation, landlessness, insecure use or mobility rights and lack of clarity regarding ownership or use rights (UN-HABITAT, 2007).
The immediate post-conflict period is very complex, when many displaced people return to their places of origin and find their houses and properties destroyed, damaged or illegally occupied by secondary occupants (Leckie, 2000). Land disputes and conflicts over land and properties are frequent problem in post-conflict contexts. Conflict sensitive approaches to land dispute may vary based on factors such as the effectiveness of local and national land administration systems, the quality of land records, and the capacity of local administrators and adjudicators (UN-HABITAT, 2009).
Post-conflict situations lead to a dysfunctional land administration system characterised by: limited prioritisation of land policy; discriminatory land law; poor institutional and regulatory framework that allowed the grabbing of public and private land by powerful individuals and groups; poor management information systems for updating records as well as weak state capacity that was incapable of helping IDPs and refugees (Augustinus and Barry, 2006). Addressing these fundamental challenges, dealing with land

administration in post-conflict situations, is no longer a matter of choice, but a core responsibility of effective peace building. Once it is understood that HLP issues may trigger secondary or tertiary conflict, it is important for peace building missions to become aware that proposals related to land management and land administration in post-conflict situations are an integral part of efforts to restore peace and stability (UN-HABITAT, 2007).
What is needed is a post-conflict land policy which focuses on the political dynamics of the conflict over land. The policy should give guidelines about the land law and the technical dimensions of land administration. Land professionals with experiences in the development of land policy documents and with appropriate knowledge in post-conflict context, could significantly contribute to this process (McAuslan, 2007).
The normative framework for addressing HLP rights in the context of displacement is summarised in the 2007: Principles on Housing and Property Restitution for Refugees and Displaced Persons (COHRE, 2007), known as 'Pinheiro Principles'. 'The Pinheiro Principles provide restitution practitioners, as well as states and UN and others agencies, with a consolidated text relating to the legal, policy, procedural, institutional and technical implementation mechanisms for housing and property restitution' (COHRE, 2007). This document is a compilation of existing rights based documents in international human rights and humanitarian law. It acknowledges that all displaced persons should be protected regarding their HLP rights; the right(s) that they had to their property should be restored or if that is not possible be compensated. The Pinheiro Principles make some references to land administration issues as well (Pinheiro Principles: 13, 15, 16, 17, 20 and 21).
Housing and property rights and land administration issues are always negatively affected by the conflict and if not addressed properly in a post-conflict context they could be cause of secondary conflicts and even erupt in a new armed conflict (Todorovski et al., 2012).
Land administration systems can suffer in several ways during a conflict. The most obvious blow follows from the loss of staff and records (Zevenbergen and Burns, 2010).

4.2 Land professionals

Staff can be killed, (forced to) leave the area or not be able or willing to return to their jobs within land administration systems. In all cases it is important to quickly identify available experienced staff and try to get them back to work as soon as possible. Most land administration staff are professionals with specific expertise, and except for (top) managers their

position should not be political, but this depends much on local circumstances (Zevenbergen and Burns, 2010).
Experiences shown that too few of the engaged personal in the emergency phase have appropriate knowledge and skills in land administration issues which have their specific characteristics and need adequate approach for land administration in post-conflict contexts (HPG, 2008; Pantuliano, 2009).
When -at the end of the day- a land registrar writes down a name of an owner in a land book, and a land surveyor draws a boundary line on a cadastral map, it could be either the start of a prosperous economic development, or the overture to a new conflict (van der Molen and Lemmen, 2004). The work of land registrars and land surveyors can be seen in a context of state and nation building (van der Molen, 2011).

4.3 Land records

Land records are the evidence of ownership and use rights. Land records are typically associated with formal land administration systems. In countries where land is administered through customary bodies, where formal legal systems are not accessible to significant parts of the population, records are kept locally and transactions recorded through simple sales contracts, witness statements or local knowledge and attribution (UN-HABITAT, 2009). During conflicts and immediately thereafter land records face a number of threats. They run the risk of being damaged or even lost due the hostilities, due the random violence directed at government offices or even targeted violence to land offices. In all cases there is however no (easy) access to the records. Land records can be simply ransacked or partly destroyed. Fully paper based systems are even more vulnerable since no formal back-ups usually exists (Zevenbergen and Burns, 2010).
Examples of the status of land records in different post-conflict contexts are as follows:
Kosovo: land records were taken away by retreating authorities when they were forced to leave the area, with good or bad intentions (Zevenbergen and Burns, 2010),
Somalia: land registries for the valuable irrigated areas in the central part of the country have been largely destroyed and will lead to significant problems once a central government and peace prevail (J. D. Unruh, 2004).
Burundi: many arrived to their villages of origin only to find their land and houses occupied by those they saw as responsible for the genocide and their exile; such persons had no reliable formal or informal system to regain their homes and lands and most were forced to return to the entry points at the border, where they were no longer eligible for food aid and household items,

as they had not managed to establish themselves in their villages of origin (UN-HABITAT, 2009),

Palestine: a copy of Ottoman land records of Palestine state rest in the UN building in New York (Zevenbergen and Burns, 2010),

Cambodia: During the Khmer Rouge era (1975-79) the state infrastructure was literally destroyed, for example, the land registration records were all lost (Törhönen, 2001),

Timor-Leste: the land and property building was among the first destroyed by militia activity along with most property rights records; the (Indonesian) head of the Dili land office took the main land books into safety during the violence in Timor-Leste (Fitzpatrick, 2002).

Some of the issues that need attention are finding and securing the land records that ere (still) available and preventing illegal occupation and construction on the other land (Zevenbergen and van der Molen, 2004)

As a summary, the land records in post-conflict land administration contexts turn out to be a vulnerable subject and always negatively affected during the conflict. Fully paper based systems are even more vulnerable than digital ones, since no formal back-ups usually exists. Land records in post-conflict land administration contexts can be: damaged stolen, lost, fraud or manipulated by powering parties (groups), partly or fully destroyed, moved in third country or even be a target for violent attack (Todorovski, 2011).

5 SUMMARY ON LAND, OTHER RESOURCES AND LAND ADMINISTRATION IN RELATION TO CONFLICT AND POST-CONFLICT CONTEXTS

The role of land and other resources in the conflict and post-conflict contexts is attracting international attention and it is a real practical challenge for the global peace and security. Here follows a summary of findings regarding land, other resources and land administration in conflict and post-conflict contexts:

- resources in some cases motivate conflicts and usually support conflict financing,
- conflicts related with natural resources are twice as likely to re-emerge in period of five years,
- *scarce resource wars* hypothesis: the more scarce the resource, the more bitter the fight, but majority of literature argues that scarce resources are more relevant in generating small local conflicts rather than civil or inter-state wars,

- effects from climate change could lead to more natural caused catastrophes, research proved that climate change do influence the risk of conflicts and violent events,
- on a contrary to the theory of scarce resources wars hypothesis, a research on climate change shows that when resources are scarce then there are fewer conflicts – wetter years being less safe than dry years,
- agrarian relations - land reforms and land (re)distribution could be seen as triggers for violent conflicts,
- on resources it could be derived that they are key to the 'sustainability' of violence,
- refugees and IDPs are a common challenge of conflict and post-conflict contexts and together with this challenges land related issues pop up as urgent problem,
- land and property disputes and claims, usually arise when displaced persons return, or from dominance struggle over land and property rights,
- land-related topics that arise in post-conflict period are: loss/destruction of properties, secondary occupations, landlessness, insecure land rights, lack of clear ownership or use rights, access to land, forced transactions, not functional land administration systems, HLP rights etc.,
- UN-HABITAT underlines that addressing the fundamental land related challenges in post-conflict settings using the land administration as an instrument, is a core responsibility of effective peace building,
- the normative framework for addressing HLP rights in the context of displacement is summarised in the 'Pinheiro Principles' (COHRE, 2007) which make a reference to land administration in several chapters,
- land administration systems in conflict and post–conflict period mostly suffer in areas of loss of staff and land records,
- historically land administration issues have not been figured prominently in UN emergency and peace building operations (only in the cases in Kosovo and East Timor).

With a number of functions like support in establishment of land market, land use, setting the tax and management of state land, land administration in post-conflict is relevant and should be recognized in peace treaties. Parties involved in formulation of peace agreements and/or strategic action plans should mention land registration not as isolated objective but rather embedded in such plans for a wider development and land policy. Land administration is an appropriate instrument for implementation of the national land policy. Failure to address land issues in post-conflict period can create significant obstacles to humanitarian interventions and early recovery responses and, if unaddressed, it may contribute to renewed violence – a threat for eruption of secondary conflicts.

6 CONCLUSIONS

This research paper, based on a literature review, made an overview of conflict and post-conflict contexts in relation to land, natural and other resources and land administration in such contexts.

This research confirmed the recognition that land was identified as a critical gap in international response capacities. It revealed the identified need to ensure that land issues are put on the agenda of the international community and that they are tackled in the negotiations for the peace agreement document or National Land Policy of the states emerging from conflict as early as possible in the post-conflict period. Where, this was not the case, development of the land segment occurred later, resulting in complicating and slowing down the post-conflict state building. As it was shown from the conflicts in past land was seen as too politically sensitive or technically too complicated to be tackled early in the post-conflict period; this research has demonstrated that it was a mistake not to address land issues promptly.

This research explored the relation between land and other resources with conflicts and post-conflict contexts. Qualitative and quantitative researches were identified that helped to better understand what the role of the natural resources is in this period and how they motivate and finance conflicts. Resources scarcity and effects from climate change are also explored, and it was shown that this has an impact on the conflicts. This research continued with exploring the characteristics of the land and land administration specifically in a context of conflict and post-conflict contexts. At the end of a conflict displaced population in large numbers returns back in their places of origin. This research has shown that together with this land-related issues like: burned or destroyed houses and properties illegally occupied by secondary occupants are critical in the post conflict contexts. The normative framework for addressing housing, land and property rights in context of displaced persons is summarised as COHRE (2007), known as 'Pinheiro Principles'. In this research, land and property disputes and claims in post-conflict period were recognised as threatening issues, when left unaddressed they were a cause for new violent situations and secondary conflicts. The literature researched in this research confirmed that land administration systems suffered mostly from the loss of land records and loss of land professionals. Having acknowledged the goal of land administration and its potential, land administration was deemed as an appropriate instrument for implementation of the national land policy, and this should be embedded in a wider development plan of the state emerging from conflict.

Phenomenon acknowledged here is 'land administration in post-conflict contexts' and it requires further research. This research revealed that land

administration in post-conflict contexts could be recognized as one of the essential elements of the overall process of post-conflict state building.

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DEVELOPMENT AND CHALLENGES OF LAND ADMINISTRATION IN ALBANIA

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SUMMARY

In many countries the trend of setting up and modernizing of efficient land administration systems has expanded rapidly over the past few decades. Guidance for the national creation and development of land administration polices and related systems could be taken from several internationally respected documents produced by international organizations. Public sector and sectorial reforms in Albania are a continuous process which is closely associated with the process of European Union (EU) integration. They represent a demanding priority for all ministries and institutions involved.

Albania is on the way to successfully implement internationally recognized best practices in land administration. There is a need to develop a fit-for-purpose and sustainable land administration system within a short time frame and at an affordable cost. Hereinafter an overview of the status of land administration in Albania is presented, with an emphasis on the modern development and changing priorities of the national registration institution and the Government of Albania (GoA). Donor projects offer good support for the creation of modern land administration and management policies and systems. Some considerations and views of the author on the path to achieving a well-functioning and sustainable system are presented later in the article.

Key words: Albania, IPRO, land administration, land administration system, land policy, property registration

INTRODUCTION

In Central and Southeastern Europe and in many countries around the world, the trend of building and modernizing efficient land administration systems has expanded rapidly in the last couple of decades. There has been growing awareness and development of land registration and land administration

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systems, spatial data infrastructures, the sustainable management of natural resources and preservation the environment due to the realization that these are all vital to local and global socio-economic progress. Challenges like boosting shared prosperity, global economic growth, reduction of poverty, energy security, health care, inclusive growth, climate change, disaster mitigation etc. must be effectively addressed with the aim of providing citizens and all members of society with a better quality of life. All these factors place an increasing pressure on land and natural resources. Land administration, the guarantee of ownership and security of tenure provide the basis for any policy and decision-making process within a nation, guided by the government's commitment and its financial support. Governments are facing the need to prioritize establishment and modernization of land administration functions and systems, and to facilitate easy use of data.

The obtaining of EU candidate status on June 24, 2014 marks an important achievement of the GoA which paves the way to acquiring full EU membership. In the last few years Albania has significantly improved the set-up and functioning of its land registration system, which is further supported by reforms, plans for electronic registration system upgrade, data completion, and data quality improvement activities. Several projects with external funding and donations have been carried out in the last 20 years. They made a considerable contribution to the renaissance of overall land and property development in the country.

FRAGMENTS OF INTERNATIONAL GUIDANCE IN LAND ADMINISTRATION

According to the UNECE definition (UNECE, 1996), land administration is the process of determining, recording and disseminating information about the ownership, value, and use of land when implementing land policies. Land is defined as the surface of the Earth, the materials beneath, the air above and all things fixed to the soil. Following Rajabifard (2007), the land administration system provides a basic foundation for the spatial enablement of a society and is considered to include land registration, cadastral surveying and mapping, fiscal, legal and multi-purpose cadastres and land information systems. Land administration system should be affordable and open to everyone, meeting the needs of all its users, and must be sustainable (UNECE, 2005).

Land administration services strongly relate to the areas of responsibility of many ministries and government organizations. All too often there have been

poor channels of communication and limited cooperation between different ministries. Rarely do governments have an integrated policy with regard to land or the land information management. Each ministry often makes up its own rules while co-operation between authorities depends more on personalities than on policies. The main reasons for the lack of strong cooperation and co-ordination are common to almost every country. This leads to inefficient governance and creates additional expense and delays in implementing projects, adversely affecting the land market and inconveniencing customers. Land administration should ideally be under the supervision of a single authority that acts as the lead agency. Such an arrangement will guarantee the best possible coordination between the various parts of the whole process and provide the necessary framework for establishing a unified land information system and service (UNECE, 2005).

As discovered already by Steudler, Rajabifard and Williamson (2004), and Halrup and Stubkjaer (2012) there is still no internationally recognized methodology to assess and compare the effectiveness of land administration systems. Instead, some studies and research works describing the situation in land and property related systems with a few simple indicators and analyzes are available for the purpose of internal or external benchmarking (Lipej, 2015).

The successes and failures of land administration reforms are almost entirely attributable to the quality of the management and the caliber of the people responsible for the systems. Even in an electronic age it is the human element that determines whether reforms are successful or not. Significant effort and resources must be invested in building and maintaining the capacity of people to manage the land administration systems (UNECE, 2005).

The newly developed concept of “fit-for-purpose” by the FIG and the World Bank (FIG, World Bank, 2014) indicates that land administration should be designed to meet the needs of people and their relationship to land, to support security of tenure for all and to sustainably manage land use and natural resources. This perspective calls for a flexible and pragmatic approach rather than requirements imposed through rigid regulations, demands for spatial accuracy and systems that may be unsustainable in less developed countries that depend on donor funding.

The Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries and Forests, endorsed in 2012, provide an excellent framework for the state development of their own strategies, policies,

legislation, programs and activities and promote responsible governance of tenure with respect to all forms of tenure: public, private, communal, indigenous, customary, and informal (FAO, 2012).

NATIONAL STRATEGIC GUIDANCE REFERRING TO LAND ADMINISTRATION FIELD OF OPERATIONS

The GoA has prepared a draft National Strategy for Development and Integration (NSDI) for the period 2014-2020 (CoM, 2013). The NSDI provides the strategic framework for all sector and cross-sector strategies and forms, the backbone of the Integrated Planning System – it links the budget to national strategic priorities and goals in a single strategic planning process. The NSDI represents the perspective of sustainable economic and social development, integration into the EU and NATO structures, as well as the achievement of the Millennium Development Goals. The vision for 2020 is to create wealth and well-being for a European Albania. Strategic goals to achieve strong, sustained and environmentally-friendly growth include among others, good governance and the rule of law along with securing property rights. Reforms will aim at safeguarding property rights and eliminating legal uncertainty as key prerequisites for development as well as attracting foreign investment and achieving EU integration. The aim over the NSDI period will be achieved through the following strategic goals, in brief:

- Adapting the legal framework to enable title registration, legalization, restitution and compensation to proceed quickly and efficiently;
- Completing national first registration and establishing a consolidated electronic public registry of immovable properties;
- Finishing the physical restitution of property where feasible;
- Creating a compensation scheme that is considered fair and consensual by all parties, and which is fiscally affordable; and
- Resolving the status of informal properties outside the legalization process.

For a competitive market economy there is a need to provide online services according to the one-stop-shop principle and to significantly improve customer services, reduce the registration time and improve transparency. Digitalization of the system is expected to further improve service delivery and transparency. The Immovable Property Registration Office (IPRO) will play an important role in implementing the strategy.

The Cross-Cutting Strategy for Reform in the Field of Property Rights for the period 2012-2020 (GoA, 2012) established the following priorities: putting the process of restitution and compensation of properties finally on the right track toward a final solution; integrating the legalized informal dwellings and constructions; completion of the first registration of all immovable property, and digitalization of the (various) systems. The strategic aim of the reform is to complete the systematic first registration in 2016 and to set up the consolidated public electronic register of immovable property and to improve the IPRO's functionalities.

The management of property rights is a particular concern due to their importance for land and credit markets and their impact on the economy's performance. The World Bank is leading the reform process on property rights. Therefore, as understood, the area is not presented in the EU Indicative Strategy Paper which sets out the priorities for EU financial assistance for the period 2014-2020 to support Albania on its path to accession (European Commission, 2014). The strategy paper defines key areas where financial assistance is most useful for meeting the accession criteria. The main financial instrument to provide EU support to the beneficiaries in implementing reforms with a view to Union membership is called the Instrument for Pre-accession Assistance (IPA II).

The GoA is endeavoring to change the way public services are provided through a variety of interventions under a citizen-centric approach, which combats corruption, fosters a customer-care culture, enhances access, as well as increases efficiency in the Albanian public administration (World Bank, 2015a). Under the leadership of the Ministry of Innovation and Public Administration (MIPA), GoA is designing a reform to improve the manner and channels in which citizens receive public services. The GoA began a reform program of public service delivery entitled Innovation against Corruption in June 2014. The objectives in implementing these reforms are to reduce the scope for corruption, foster a citizen-focused ethos for provision of public services, and reduce the time of service delivery both for citizens and businesses. The proposed one-stop-shop Citizen Service Center (CSC) in Tirana, the regulatory reform, increasing the number of services provided online, process re-engineering, and automation are all key elements of this reform. As part of the reform, in October 2014, ADISA, the Agency for the Delivery of Integrated Services in Albania, was established to manage the centralized delivery of public services to the citizens. Its expanded mandate includes implementation of the separation of the front office from the back office in all central institutions. This process involves the overhaul of public service delivery with the establishment of service

delivery standards for the citizens and performance monitoring for service window clerks, based on customer-care principles. IPRO will again play an important role in implementing the CSC and these reforms.

Building an administration that is reliable and able to meet the challenges of national development and the priorities of EU membership continues to be an important priority. The draft Crosscutting Public Administration Reform (PAR) Strategy 2015-2020 takes the EU integration process requirements into account and provides the overall framework for the modernization and transformation of public administration institutions and practices in the country. The new draft strategy focuses not only on overall civil service development, but further addresses the need for the more effective delivery of public services to citizens and businesses towards increasing transparency and accountability and strengthening governance innovations (MIPA, 2014).

The administrative and territorial reform was adopted during 2014 by making some fundamental changes to the local government units. The number of local government units is being reduced from 373 to 61 and they will be organized into municipalities. New larger municipalities will be able to face the challenges of both economic development and service delivery to the public. The setup of the new municipalities was planned to take place following the local elections held on June 21, 2015 (Lipej, 2012-2015).

OVERVIEW OF LAND ADMINISTRATION IN ALBANIA

Property rights in post-communist Albania have gone through a dynamic process encompassing massive legislative and institutional changes. Albania has carried out land and property administration reforms since 1991 and substantial progress has been made in the ownership transfer and recognition of property rights. Land privatization, registration of ownership rights and land use planning have been incrementally addressed by the government (World Bank, 2007). During 1991-1994, the privatization programs and the transfer of ownership to new owners introduced 500,000 owners with around 3 million private properties for agricultural land, residences or commercial units (Government, 2012). In 1994, as a result of the Law no. 7843 On registration of immovable properties, 36 offices (35 local offices and one Central office) for registering properties were set up, administering 3,057 cadastral zones covering the entire territory of the country, and under the supervision of the Central office of the IPRO. IPRO as a public institution combined maps related to real estate and documents held by several

institutions, including the Kadastra offices for spatial planning and the Hipoteka offices for urban land (in operation before 2003).

Several programs relating to the systematic first registration of real estate have been carried out in the period 1994–2014, supported by national and international funding (Project Management Unit of the Ministry of Agriculture and Food/ USAID – United States Agency for International Development/ World Bank/ OSCE – Organization for Security and Co-operation in Europe). Systematic first registration began in rural areas in 1995, which was followed by urban areas. The first registration process is still under way. The Land Administration and Management Project (LAMP), which was supporting, among others, activities of systematic first registration, was finished in June 2014. As of October 31, 2014 357.383 properties were registered in the LAMP out of the target 400.000 (World Bank, 2014a). The remaining first registration works from the LAMP and the first registration of about 350 cadastral zones without any registration, are planned to be carried out by the IPRO and the private sector in the next few years. The first registration of forests and pastures is behind schedule. The majority of state and communal forests and pastures is not registered (in more than 2,000 cadastral zones forests and pastures were not registered in implemented projects the period 1994-2002). Forests and pastures were registered in more recent projects, as well as in LAMP. In addition, the Connecting Natural Values to People (CNVP) foundation is assisting communes in preparing materials for the registration of ownership rights (Lipej, Male, 2015). It is envisaged that communal forests and pastures in about 2,300 cadastral zones are to be registered in the Environmental Services Project (ESP) in the next five years (World Bank, 2014b).

The new Law on Immovable Property Registration (Law no. 33/2012) was enacted in 2012 (Official Gazette, 2012). It establishes principles for fast and effective registration procedures, permits the registration of properties constructed before 1991, establishes rules for improving and updating of data, transforms the IPRO into a self-financing institution (since April 1, 2013), and guarantees the information issued. The Law supports the IPRO to provide on-line services for customers, relying on the “one stop-shop” principle, to secure registration of real estate titles and to establish a portal for citizens requiring services for registration of real estate (Lipej, Male, 2015).

IPRO is a non-budgetary public legal entity under the authority of the Ministry of Justice. Its activity is based on the legal certainty, transparency,

lawfulness and registration priority principles and is focused on standardization of the real estate registry by connecting the ownership title of particular real estate with its geographical position. In that regard, the IPRO manages the property registration system, established for the registration of property titles and other property rights over the property, according to legal documents, which certify the ownership of property. The electronic property register was developed in the IPRO, and is nowadays called the ALBSReP (Albanian Sistemit Elektronik të Regjistrimit të Pasurive të Paluajtshme). The ALBSReP front office and back office were developed by the IPRO's in-house developers during the course of 2010/2011. The system allows management and archiving of documentation concerning the services provided, as well as the exploitation and the updating of documents that are finally registered. The system has a modern architecture, is ISO-compliant and delivers on-line services to notaries. The system is currently in the operation in all 35 local IPRO offices in the country since October 31, 2014 (World Bank, 2014a).

In the last few years, the IPRO and its local offices have gone through a significant institutional program of changes. In order to support new requirements and effectively manage the new organization a Strategic business plan for the period 2014-2018 was developed through a Sida (The Swedish International Development Cooperation Agency) Twinning project (World Bank, 2014a). Key highlights of the Strategic business plan include as presented below.

The IPRO mission statement: the IPRO registers immovable properties, ownership titles and other real rights, maintains and administers the register of properties, the cadastral maps and legal documentation, which proves the ownership rights of citizens, natural and legal persons in order to assure legal certainty in relation to actions concerning immovable property.

The IPRO vision for 2018: the IPRO as a self-funded and client-oriented organization administers and guarantees full, accurate, sustainable and up-to-date registration of immovable property information, and provides geospatial information and other related services. Products and services are provided with effectiveness and efficacy in a transparent and non-discriminatory manner. Through its products and services, in line with EU standards and best international practices, the IPRO contributes to the building and stability of the real estate market and therefore supports the social and economic development of Albania.

IPRO strategies include provision of standard qualitative data for all properties, improvement of client-oriented services, improvement of the management system and building of technical capacities of the staff, and extension of the scope of activities.

Key institutions functioning in Albania with regard to property titles (altogether, more than eight institutions deal with these issues) are: IPRO, Agency of Legalization, Urban Planning and Integration of Informal Zones/Buildings (ALUIZNI), and Albanian Property Restitution and Compensation Agency (PRCA or AKKP). These institutions cooperate mainly on formal bases and do not work sufficiently in a harmonized way. In the Ministry of Justice a Department for Coordinating Property Issues was set up following an Order of the Prime Minister at the end of 2011. The Department shall supervise and monitor the activities and propose recommendations for taking concrete measures (Government, 2012).

In Doing Business Report on Registering property for the year 2014, Albania was ranked in 118th place out of 189 economies worldwide. DTF score for registering property (0-100) was 60.67. The number of procedures for a property transaction was 6, the time needed was 22 days and the cost was 9.9 % of the property value (World Bank, IFC, 2014). Economies that rank well on the ease of registering a property tend to have simple procedures, effective administrative time limits, fixed registration fees, low transfer taxes and online registries. All of this is suggested to be the objective of the IPRO and the GoA in the near future (Lipej, Male, 2015).

ONGOING PROJECT ACTIVITIES IN THE LAND ADMINISTRATION FIELD

The ESP financed by the World Bank, Global Environment Facility and Swedish Government is carried out since early 2015. The project development objective is to support sustainable land management practices and increase communities' monetary and non-monetary benefits in targeted project areas which are mainly in erosion prone rural upland areas. The project will particularly focus on enhancing the financial, economic, and institutional sustainability of land use and natural resources management, and will help build capacities of Albania farmers, community organizations and GoA institutions to effectively use EU funding (World Bank, 2014b).

The majority of forests and pastures is not registered in the IPRO central electronic property register ALBSReP and therefore users cannot enjoy all the benefits of owned land and are not stimulated to maximize the forest's and pasture's potential. The registration of forests and pastures in the ESP

was originally planned to support those areas that were transferred from the state to the communes (for about 60% of forest and pasture areas represented in about 2.300 cadastral zones). With the implementation of the territorial and administrative reform dated 2014 the first registration should cover all public forests and pastures, communal and currently state-owned, except protected areas, which are expected to be transferred to the ownership of the newly formed 61 municipalities (Lipej, 2012-2015).

Currently supported by a one-year EU-financed grant, the Land Administration Data Improvement (LADI) program is ongoing. It is managed by senior staff of the World Bank. It is expected that LADI will develop a methodology and guidance for the IPRO on how to digitize, update, and improve the cadastre and registration information, data quality, mainly through the use of new orthophotos purchased by the GoA, and expected to be delivered in use gradually, by the end of 2015. It is also expected that technical processes will require some changes in legislation (World Bank, 2014a, Lipej, 2012-2015).

Late in August 2015, the World Bank Group Board of Executive Directors approved financing for the new Citizen-Centric Service Delivery Project which will aim to improve the efficiency of the delivery and access to administrative services in Albania. The project is aligned with the GoA's reform program of public service delivery Innovation against Corruption launched in June 2014. The core focus of the project is to improve predictability and convenience and reduce the time taken to access administrative services for all Albanian citizens. The project has three components: Back-end systems (business process reengineering of services, building new IT systems and automation of services); Front office interface (reforming front offices in existing agencies, improving citizen convenience with one-stop shops, improving the online delivery of services, implementing beneficiary feedback, and providing information on services); and Capacity to deliver (deliver improvements in services, including implementation of a communications strategy and campaign). The IPRO will be in the heart of the institutions involved in the project and under reform with its core administrative services, starting with piloting in Tirana for the proposed one-stop-shop CSC (World Bank, 2015a).

To support the GoA reform strategies in the field of immovable property registration and land management and to continue the efforts of the LAMP finalized in 2014, the outline of a new project Integrated Land Management Project (ILMP) with the World Bank have been discussed. The proposed project development objective would be to contribute to an increase in the

efficiency, transparency, reliability and availability of an integrated land management system through integration of key information technology (IT) systems, and geo-spatial and immovable property information. The proposed project will potentially have the following four components: E-Governance for Enabling Integrated Land Management, Data for the Integrated Land Management System, Property Valuation and Taxation, Project Management, Capacity Building and Monitoring and Evaluation. The proposed implementing agencies will be the IPRO, State Authority for Geospatial Information (ASIG), and MIPA (World Bank, 2015b). The project start will be probably at the beginning of 2017.

SOME CONSIDERATIONS ON THE ROUTE TO A MORE EFFICIENT PROPERTY REGISTRATION AND LAND ADMINISTRATION SYSTEM

In the period of the country's preparations for EU membership, every public sector institution will be under extreme pressure and engaged in several reform processes (some of the reforms were briefly presented above and their requirements for the property sector will not be repeated in this chapter). Potentially, not all requirements, action plans, monitoring indicators and benchmarks will match. There is no doubt that in the land administration field the IPRO will play the most important role and will have to deal with numerous priorities, not all of which might be achievable for different reasons.

A long-term objective should be to build an effective, reliable and transparent land administration system in the country for recording land ownership, land values, and land use as the foundation for the efficient operations of a market economy. Developing an efficient land administration system is besides the institutional, organizational, technical, legal, cultural, and economic challenges a sustainability matter which should be considered already in the design phase. In Albania, a unified land cadastre and registration system is administered by a single agency, the IPRO, which is functioning on the cost recovery principle, which already represents a very advantageous result. Many donor and loan supported efforts were and are still invested in, in the form of projects to develop the system and support the massive collection of property technical and legal data. As learned from experience, not only in Albania but also in other countries in transition there is a risk and a challenge in keeping the systems running and further developing after the donor and international consultants have left. Therefore, it is important for the current and new projects that a reasonable proportion

of beneficiary employees and management structures understands the approach, is actively involved in all phases of the project and has a clear commitment to the approach and related results. It is understandable that all donor interventions on a large scale have to be in support of the reform and strategic agenda of the GoA and that good mutual cooperation, transparency, and trust must be assured for quality outcomes. The end-users or clients of the land administration system are those who make use of data and information and have to be engaged in assessing the success of the new services, system functionalities and data collection when the system is implemented.

To support land administration, a sound national land policy with the aim to achieve certain objectives relating to the security and distribution of land rights, land use and land management, and access to land, should be developed further on. Land policies are of fundamental importance to sustainable growth, good governance, and the well-being of, and the economic opportunities open to, both rural and urban dwellers - particularly the poor (Deininger, 2003). In the near future, the land policy and land management areas deserve GoA's attention and action.

Currently, land administration and related policies involve different ministries and institutions and their cooperation have a serious need to be improved and synchronized. Ideally, a single neutral authority or agency should be politically nominated to lead the activities but it seems unlikely that because of different reasons and consequences this model could be a successful choice. In a case if there is no consensus on the lead agency, a high-level coordination board set up by the GoA can improve the cooperation between different authorities. The coordination board should have a strong position within the GoA and the GoA's full commitment. The coordination board may need to establish one or more joint technical support groups to provide technical assistance.

CONCLUSIONS

The implementation of reforms, ongoing and foreseen development of activities in the field of land administration and land policy in Albania has been extremely challenging over the years and will be in core of future economic development. Access to urban and rural land and security of land-related rights has been ever more recognized as the basis of economic and social life and prosperity. Many highly complex problems in nature were overcome in the past, sometimes politically sensitive and often difficult to

resolve, and some extremely difficult ones remain to be solved. Designing new rules, legislation, structures and procedures in the field to better fit the requirements of the society and its citizens is an accountable and responsible activity which is an ongoing and long-term process. Strong political support for the reform is needed, entailing a process that needs time to be built up, and political awareness is constantly progressing.

Land and property issues are inter- and multidisciplinary, and involve different institutions and organizations. Constructing a dialogue, common understanding, and consensus on the future reforms and the best way to achieve relevant and effective solutions is the key to success. The GoA and relevant institutions need to continue listening to and engaging with different groups of stakeholders and users, providing them with a platform for discussion and feedback to reform. A participatory consultation process has been successfully piloted as part of the determination of users' rights in communal forests and the lessons learnt could be extended to a larger scale. Gender and vulnerability issues are slowly but gradually gaining special attention and successful results in both the field and practice. The GoA should also be encouraged to further elaborate on the cooperation with the private sector in the long run, not only in the form of the usual contractual relations. Shared responsibility, risks, and benefits could be jointly developed in the form of a public-private partnership.

Without the involvement of a strategically, policy- and forward-oriented and committed GoA, property and land-related institutions as well as dedicated and committed public and private sector employees implementing the programs, the reforms cannot be implemented successfully. Therefore, special attention must also be paid to the sustainability of the human resource capacity, staff and career development and adequate training.

Albania has made great achievements in the area of property registering in the past few years, supported by means of modern information communication technology but many challenges remain for the IPRO, other related institutions, and the GoA to continue the activities, and to improve the efficiency and effectiveness of land administration and land management through enhanced tenure security.

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REGIONAL IONOSPHERIC DELAY CORRECTION MODEL FOR SINGLE FREQUENCY PPP USERS IN TURKEY

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ABSTRACT

Ionospheric delay is the major challenge for Single-Frequency Precise Point Positioning (SF-PPP) users. Therefore, a number of organizations have developed ionospheric delay correction products including the International GNSS Service Global Ionospheric Map (IGS-GIM). Unfortunately, however, the IGS-GIM has a limited spatiotemporal resolution, which in turn limits the PPP accuracy. To overcome this limitation, we develop a regional ionospheric delay correction model for SF-PPP users in Turkey. The developed model has spatial and temporal resolutions of 1º×1º and 15 minutes, respectively. GNSS observations from 6 IGS and EUREF reference stations surrounding Turkey are processed using the PPP module in the Bernese 5.2 software package. The resulting model is tested for PPP applications in Turkey. The PPP positioning accuracy and convergence time obtained through the developed model are assessed and compared with those obtained through the IGS-GIM counterparts. The results reveal that the developed regional ionospheric model is found superior to the IGS-GIM model.

Keywords: ionosphere modeling, single-frequency PPP, TEC

1. INTRODUCTION

Ionospheric delay is one of the main error sources in precise point positioning applications. For dual frequency PPP users, ionospheric delay

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can essentially be eliminated using the so-called ionosphere-free linear combination. For single-frequency PPP, however, an ionospheric delay correction model must be used. For this purpose, a number of models are developed for single-frequency PPP applications. A widely-used global ionospheric mitigation model is the International GNSS Service Global Ionospheric Map (IGS-GIM) product. Unfortunately, the IGS-GIM has a spatiotemporal resolution limitation, which may not be adequate for single-frequency PPP users.

A number of regional ionospheric models have been developed by a number of researchers (e.g., Nohutcu et al. (2010); Alothman et al., 2011; Yao et al., 2013; Abdelazeem et al., 2015). Nohutcu et al. (2010) developed a regional ionospheric model over Turkey using the quadratic B-spline function based on GPS observations. Their results were comparable to those obtained through the Bernese software, which uses the spherical harmonic function model. Abdelazeem et al. (2015) developed a real-time regional ionospheric model (RT-RIM) over Europe using the IGS real-time service (IGS-RTS) products. The results showed that their developed model improved the PPP accuracy and convergence time by about 40%, 55% and 40% for the horizontal, height and 3D components, respectively in comparison with the IGS-GIM.

The objective of this study is to develop a Regional Ionospheric Model (RIM) for single frequency PPP user in Turkey. The proposed RIM has spatial and temporal resolution of 1°×1° and 15 minutes, respectively. GNSS observations from 6 IGS and EUREF stations surrounding Turkey are processed using the PPP module in the Bernese 5.2 software package. In order to validate the developed RIM, the Single-Frequency Precise Point Positioning (SF-PPP) accuracy and convergence time obtained through the model are estimated and compared with those obtained through the IGS-GIM. The findings reveal that the developed model improves the positioning accuracy in comparison with the IGS-GIM model.

2. PROPOSED IONOSPHERIC MODEL DEVELOPMENT:

The basic GNSS observation equations can be defined as follows (Kleusberg and Teunissen, 1998):

$$P_i = \rho_r^s + c(dt_r - dt^s) + I_{r,i}^s + T_r^s + c\left(d_{r,i} + d_i^s\right) + \varepsilon_{p,i} \quad (1)$$

$$\varphi_i = \rho_r^s + c(dt_r - dt^s) - I_{r,i}^s + T_r^s + c\left(\delta_{r,i} + \delta_i^s\right) + \lambda_i N_i + \varepsilon_{\varphi,i} \quad (2)$$

where P_i and φ_i are the pseudorange and carrier phase measurements on frequency i in meter , respectively; ρ_r^s is the satellite-receiver true geometric range; c is the speed of light in vacuum; dt_r and dt^s are the receiver and satellite clock errors, respectively; $I_{r,i}^s$ the ionospheric delay; T_r^s the tropospheric delay; $d_{r,i}$ and d_i^s are the code hardware delay for the receiver and the satellite, respectively; $\delta_{r,i}$ and δ_i^s are the carrier phase hardware delay for the receiver and the satellite, respectively; λ_i is the wavelength of carrier phase; N_i is the non-integer phase ambiguity, and $\varepsilon_{p,i}$ and $\varepsilon_{\varphi,i}$ are the code and phase unmodeled errors, including noise and multipath.

Geometry-free linear combinations are formed using the un-differenced carrier-smoothed code observations, which eliminate the geometrical term, tropospheric delay, receiver and satellite clock errors as follows (Dach et al., 2007):

$$P_4 = P_1^- - P_2^- = \left(1 - \frac{f_1^2}{f_2^2}\right) I_r^s + c(\Delta b^s + \Delta b_r) \tag{3}$$

where P_1^- and P_2^- are the smoothed code observations on L_1 and L_2, respectively; f_1 and f_2 are the carrier phase frequencies on L_1 and L_2, respectively; I_r^s is the ionospheric delay of L1; c is the light speed in vacuum; Δb^s and Δb_r are the differential code bias (DCB) for the satellite and the receiver, respectively.

Based on Equation 3, the slant TEC along the satellite-receiver path can be determined as follows:

$$STEC = \left(\frac{f_1^2 f_2^2}{40.3(f_1^2 - f_2^2)}\right)[P_4 + c\,(\Delta b^s + \Delta b_r)] \tag{4}$$

The vertical TEC is estimated using the Modified Single Layer Model (MSLM) mapping function which assumes that all free electrons are concentrated in a shell of infinitesimal thickness at an effective height *H*. The effective height *H* corresponds to maximum electron density at the F2 peak ranges from 350 km to 450 km. The vertical TEC is estimated at the Ionosphere Pierce Point (IPP) as follows (Schaer, 1999):

$$VTEC = STEC * cos\left(arcsin\left(\frac{R}{R+H} sin(\alpha z)\right)\right) \tag{5}$$

where z is the satellite's zenith distance at receiver; R is the mean radius of the Earth; H is the effective height and α is a correction factor. Best fit of the MSLM with respect to the JPL Extended Slab Model (ESM) mapping function is achieved at H = 506.7 km and α = 0.9782, when using R = 6371 km and assuming a maximum zenith distance of 80 degrees (Dach et al., 2007).

In order to model the vertical TEC on a regional scale, the spherical harmonic function is used depending upon the geographic latitude (β) and the sun-fixed (s) longitude of the IPP, respectively (Schaer, 1999):

$$E(\beta, s) = \sum_{n=0}^{n_{max}} \sum_{m=0}^{n} P_{nm}^{-}(\sin\beta)\,(a_{nm}\cos ms + b_{nm}\sin ms) \qquad (6)$$

where n_{max} is the maximum degree of the spherical harmonic expansion; P_{nm}^{-} are normalized associated Legendre functions of degree n and order m; a_{nm} and b_{nm} are the unknown coefficients of spherical harmonics.

Substituting Equations 4 and 5 into Equation 6, the spherical harmonic model can be rewritten as follows:

$$\sum_{n=0}^{n_{max}} \sum_{m=0}^{n} P_{nm}^{-}(\sin\beta)\,(a_{nm}\cos ms + b_{nm}\sin ms) = \left(\frac{f_1^2 f_2^2}{40.3(f_1^2 - f_2^2)}\right)[P_4 + c\,(\Delta b^s + \Delta b_r)] * \cos\left(\arcsin\left(\frac{R}{R+H}\sin(\alpha z)\right)\right) \qquad (7)$$

where a_{nm}, b_{nm}, Δb^S and Δb_r are the unknowns parameters to be estimated. In order to separate the DCBs of the satellites and receivers, an additional constraint must be used, as follows:

$$\sum_{s=1}^{s=max} \Delta b^s = 0 \qquad (8)$$

3. METHODOLOGY:

A regional network consisting of 6 IGS and EUREF stations surrounding Turkey are used in order to develop the regional ionospheric model (Figure 1). GNSS observations for DOY 362 in 2013 have been downloaded (BKG, 2015). The geomagnetic activity is quiet (A_P-index=2), while the solar

activity is medium ($F_{10.7}$- index= 130.1) (OMNIWeb, 2015). Each observation file has a 24-hour time span and a 30 second time interval. The elevation cut-off angle is selected to be 15°. The observation files are processed using the PPP module in Bernese 5.2 software package. In order to develop the RIM, the IGS final satellite orbit, satellite clock and earth orientation parameters are used (IGS, 2015) and then are converted into the Bernese formats. The un-differenced code observations are smoothed. In the parameters estimation process, the effective height is selected to be 450 km. In addition, a maximum degree and order equal to 6 of the spherical harmonic expansion are selected with a 15-minute interval. A group of 49 coefficients of the spherical harmonic model is obtained each time epoch. Then, to create the vertical TEC maps a spatial and temporal resolution of 1º×1º and 15 minutes, respectively, are selected.

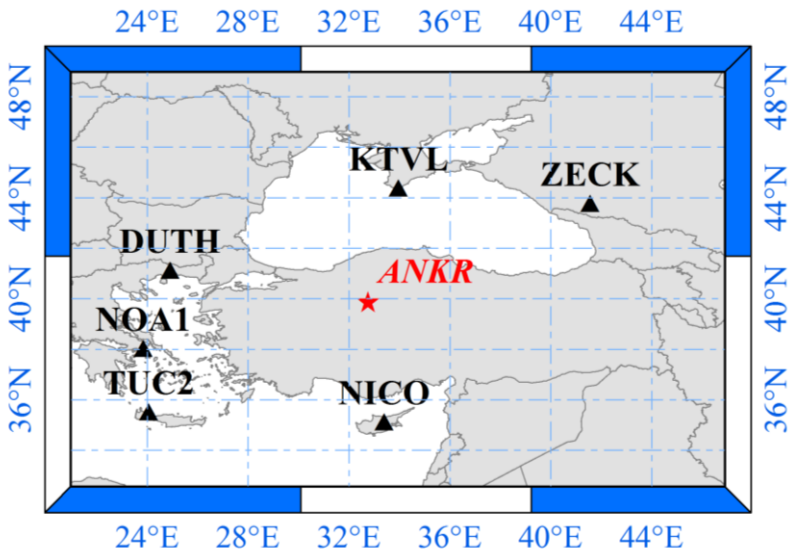


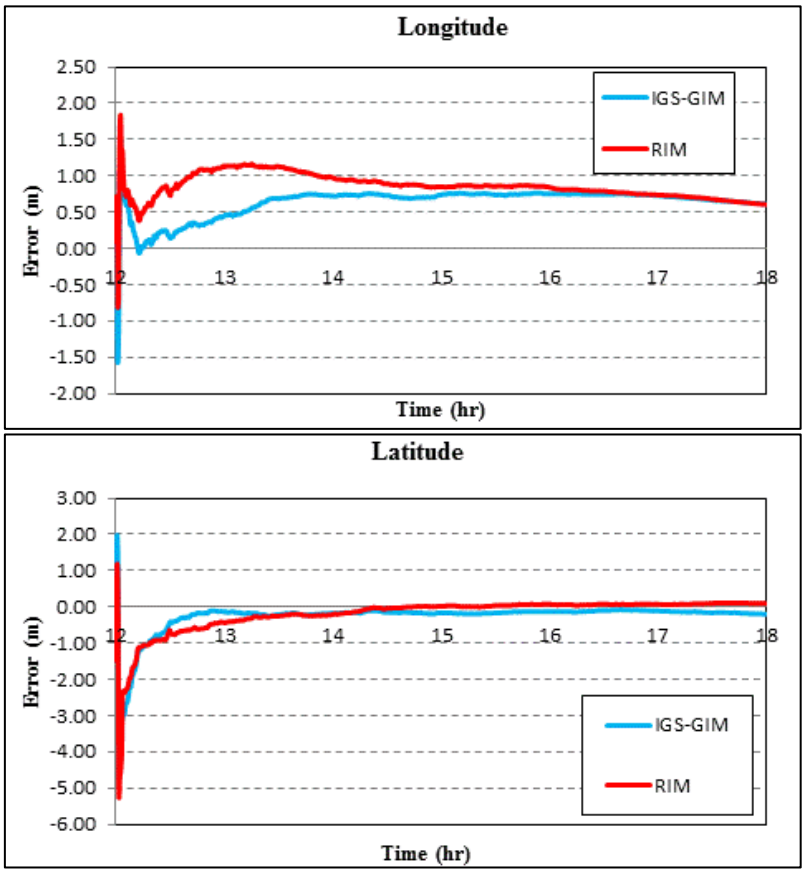
Figure.1 Reference stations distribution (with triangle shape), and examined station (with asterisk shape).

4. RESULTS AND ANALYSIS:

In order to assess the proposed model, GNSS observations from another set of stations in Turkey have been processed using the Natural Resources Canada (NRCan) GPSPace PPP software. Only the results of station ANKR

are presented in this paper. The GNSS observation time window has been selected to be 6 hours starting at 12:00 hour in the GPS time frame (i.e. 14:00 local time, which corresponds to the peak ionospheric activity in Turkey). The IGS final precise orbit and clock products have been used to account for the satellite orbit and clock errors, respectively. The tropospheric delay has been accounted for using the Hopfield model with the Neil mapping function. The PPP accuracy and convergence times obtained through the RIM have been estimated and compared with those obtained through the IGS-GIM model.

Figure 2 shows the convergence time for the single-frequency PPP solution using the IGS-GIM and the developed RIM, respectively. It is shown that the proposed model speeds up the convergence time with respect to the IGS-GIM model. In addition, the proposed model has a positioning accuracy better than that of the IGS-GIM counterpart particularly in the height component. This confirms that the RIM represents the ionosphere characteristics better than the IGS-GIM in the area under consideration.



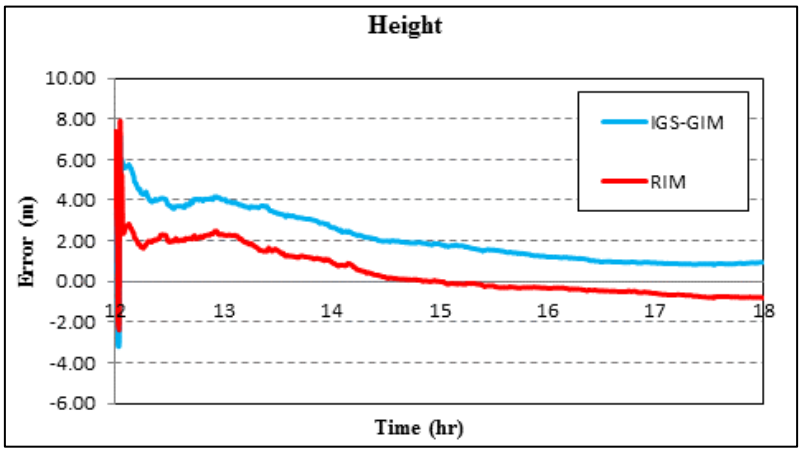


Figure 2 PPP convergence time using the IGS-GIM and the RIM models.

The estimated PPP station coordinates have been compared with those of the EUREF final weekly counterparts. Table 1 summarizes the mean difference for the horizontal and height components.

Table 1 Statistical parameters of the positioning accuracy

Model	Mean (m)	
	2D	Height
IGS-GIM	0.643	0.939
RIM	0.608	-0.811

As shown in Table 1, the positioning accuracy is improved when the proposed RIM is used in comparison with the IGS-GIM model. This is particularly significant in the height component. The horizontal positioning accuracy is improved from 0.643 to 0.608 m. The height error is reduced from 0.939 to 0.811 m.

5. CONCLUSION:

In this study, a regional ionospheric model for single-frequency PPP users in Turkey has been developed. The proposed model has 1°×1° spatial resolution and a 15-minute temporal resolution. GNSS observations from 6 IGS and EUREF reference stations surrounding Turkey have been processed using the PPP module in Bernese software package to develop the model. In order to validate the developed model, the PPP convergence time and positioning accuracy have been assessed and compared with those of the IGS-GIM counterparts. The findings indicate that the developed model accelerates the

convergence time. In addition, the positioning accuracy is improved in comparison with the IGS-GIM model.

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SEISMIC VULNERABILITY OF RC BUILDINGS IN POLOG VALLEY

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Elena DUMOVA-JOVANOSKA[3]

SUMMARY

A procedure for evaluation of seismic vulnerability of RC buildings has been proposed. Applying the nonlinear static "pushover" analysis, the parameters of nonlinear behavior of the selected set of reinforced concrete buildings have been defined. The vulnerability indices as a measure of damages to each building have been defined and computed in the form of a scaled linear combination of the state of nonlinear behavior of the components at the point of termination of the "pushover" analysis. The computed values of the vulnerability factors obtained by "pushover" analysis are in the range of 0.2-0.3 and point to satisfactory behavior of the analyzed buildings.

Key words: *vulnerability, RC buildings, "pushover" analysis, vulnerability index*

INTRODUCTION

This paper deals with a topical problem in the field of vulnerability of existing structures to seismic effects. The present regulations in the domain of seismic design in R. Macedonia have not only been not upgraded since 1981 when the last regulations on seismic design were passed, but they do not at all treat the reliability of constructed structures. Presently, this is a very important field of research in the world. Hence, it is of a big importance to launch an initiative for acquisition of data and creation of a data base necessary for getting an insight into the existing conditions.

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The research presented in this paper was carried out by a simple procedure of seismic risk assessment on the territory of the selected region in RM, or more precisely, the Polog valley. The selection of the subject of research was motivated, first of all, by the extensive growth of these populated places in the indicated period. The selected structures were categorized and the key elements affecting the behavior of the structures in seismic conditions were identified.

Reinforced concrete frame structures are the most frequently present type of a structural system that is used for buildings in this region. Although current seismic regulations enable satisfying behavior of reinforced concrete buildings, there is still a big number of seismically weak-inadequate structures whose compliance with these regulations has still not been proved. Identification of seismically weak structures is therefore of a great importance in assessing the losses in the case of a possible future strong earthquake and establishing priority criteria for strengthening of these structures.

Modern procedures for assessment of vulnerability of buildings are primarily focused on the structural system, the capacity, the project and the response parameters. These parameters will enable a more realistic assessment of the expected behavior if the constructed structure reflects the prescribed structural and architectonic characteristics and conditions.

The proposed methodology represents a combination of micro and macro approach to analysis of the seismic vulnerability of existing structures. Namely, at the level of the integral structure, a nonlinear static analysis of the behavior of the selected set of 20 characteristic structures was carried out. Such an approach belongs to the group of methods that involve micro-modeling. After obtaining the response of the selected representative structures, the results of the nonlinear static analysis were used in drawing general conclusions on the level of seismic vulnerability of a whole class of structures designed in accordance with the valid regulations. Such an approach represents a typical example of a macro-approach to analysis of the seismic vulnerability.

Nonlinear static “pushover” analysis as a procedure for assessment of the seismic response of reinforced concrete buildings was carried out by use of the SAP2000 computer programme [8]. Using the parameters of nonlinear behavior of the structural elements obtained by nonlinear analysis, a simplified methodology for definition of the seismic resistance of these structures through computation of the vulnerability indices of the buildings is proposed.

ANALYZED STRUCTURES

In the research presented in this paper, individual residential structures for family housing and collective residential buildings were considered. Twenty structures in different municipalities of the Polog region were analyzed [1].
Some of the structures contain business premises at the ground floor for different purposes. Most of the analyzed structures are in Gostivar and Tetovo, while some are located in the rural municipalities. The analyzed structures are with a different number of storeys and are situated on different locations.
According to the number of storeys, the structures are divided into 3 categories as follows**: up to GF+3, up to GF+5 and from GF+5 to GF+10 storeys,** as shown in Table 1. Table 2 displays the analyzed structures according to type, structural system, year of construction and number of storeys.

Table 1. Considered structures per municipalitie

Number of storeys	Number of structures in Gostivar included in the research	Number of structures in Tetovo included in the research	Number of structures in rural municipalities included in the research
Up to GF+3 storeys	12	6	10
Up to GF+5 storeys	8	6	
Up to GF+10 storeys	2	6	

The data in Table 2 show that the structures were constructed in the period 1997 to 2011. Most of them represent individual and collective residential buildings with a height of up to 6 storeys. It can also be observed that all the selected structures have a reinforced concrete structural system consisting of RC frames and RC slabs as floor structures.

Table 2. Analyzed structures according to type of structural system, year of construction and number of storeys

Identificat. no.of the structure	**Type of structure**	**Structural elements**	**Dat**	**Number of storeys**
No.1	Collective residential building with business premises	Reinforced Concrete frames and RC slab	2002	**9** **B+GF+M+5+A**
	Weekend house-	Reinforced		**1**

No.2	individual residential building	Concrete frames and RC slab	2002	**B+GF**
No.3	Individual residential building with business premises	Reinforced Concrete frames and RC slab	2002	**4** **B+GF+2**
No.4	Collective residential building with business premises	Reinforced Concrete frames and RC slab	1999	**6** **B+GF+4**
No.5	Collective residential building with business premises	Reinforced Concrete frames and RC slab	2006	**7** **B+GF+4+A**
No.6	Individual residential building	Reinforced Concrete frames and RC slab	Пред 1997	**3** **GF+2(1+A)**
No.7	Individual residential building	Reinforced Concrete frames and RC slab	2008	**3** **B+GF+1**
No.8	Collective residential building with business premises	Reinforced Concrete frames and RC slab	2011	**8** **B+GF+5+A**
No.9	Collective residential building with business premises	Reinforced Concrete frames and RC slab	2006	**6** **B+GF+3+A**
No.10	Individual residential building - duplex	Reinforced Concrete frames and RC slab	2009	**3** **S+GF+1**
No.11	Individual residential building with business premises	Reinforced Concrete frames and RC slab	2009	**4** **B+GF+2**
No.12	Collective residential building with business premises	Reinforced Concrete frames and RC slab	2008	**9** **B+GF+7**
No.13	Collective residential building with business premises	Reinforced Concrete frames and RC slab	2004	**6** **B+GF+4+A**
No.14	Collective residential building with business premises	Reinforced Concrete frames and RC slab	2008	**8** **B+GF+6**
No.15	Individual residential building with business premises	Reinforced Concrete frames and RC slab	2009	**4** **B+GF+2**
No.16	Individual residential building	Reinforced Concrete frames and RC slab	2005	**3** **B+GF+1**
No.17	Individual residential building	Reinforced Concrete frames and RC slab	1997	**3** **GF+2**
No.18	Weekend house-individual residential	Reinforced Concrete frames and	2009	**3** **B+GF+A**

	building	RC slab		
No.19	Individual residential building with business premises	Reinforced Concrete frames and RC slab	2006	**4** **B+GF+2**
No.20	Individual residential building – duplex	Reinforced Concrete frames and RC slab	2009	**2** **GF+1**

Each structure was identified by an ordinal number, address/location, investor, date of construction, description of type of structure, number of storeys and structural system.

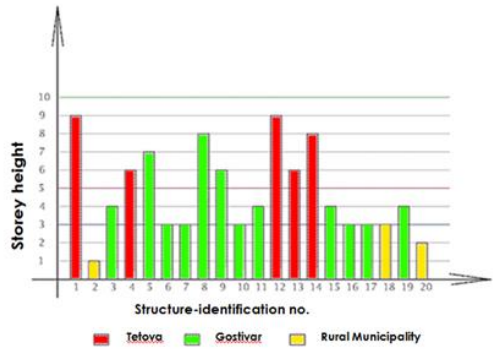

Figure 1. Structures marked per municipalities

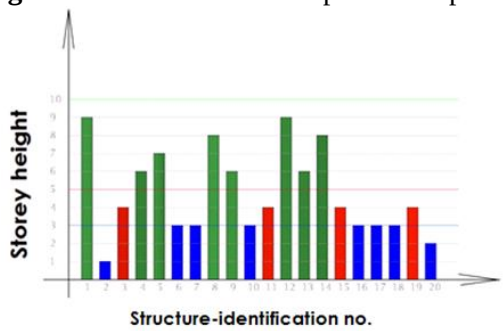

Figure 2. Structures marked per number of storeys

Figure 3. Location of the analyzed structures

ANALYSIS AND RESULTS OBTAINED

To evaluate the bearing capacity of the selected reinforced concrete buildings, a nonlinear static "pushover" analysis was carried out by use of the SAP2000 computer programme. Plastic hinges were selected to take place in the cross-sections of the structural elements where initial reaching of the static quantities causing yielding was expected. Under the effect of horizontal loads, such cross-sections are most frequently located at the ends of the structural elements. Hence, plastic hinges were located at the ends of all the beams and at the ends of all the columns of the structure as places to be the first to reach the ultimate moments [2].

With the performed nonlinear static "pushover" analysis, the capacity curves for all the selected buildings were obtained as relationships between the total seismic force at the base and the maximum horizontal displacement at the top. These curves could provide an insight into the behavior of the structures, their minimal evaluated seismic bearing capacity, structural stiffness and maximum displacement.

The vulnerability index defined with the "pushover" analysis is the measure for the damages to the buildings. It is defined as a scaled linear combination (weighted average) of the measures of behavior of the plastic hinges formed in the elements and is computed from the levels of behavior of the elements at the performance point or at the moment of termination of the "pushover" analysis. The vulnerability factor of a building is computed by use of the following expression:

$$F_{I_{3rp}} = \frac{1.5\sum N_i^c x_i + \sum N_i^h x_i}{\sum N_i^c + \sum N_i^h} \quad (1)$$

where, N_i^c and N_i^h represent the number of formed plastic hinges in the columns and the beams, respectively, for the i-th level of behaviour (i=1,2,…..,6) , [2].

The force-deformation curve for the plastic hinges was divided into 6 levels of behavior as follows: *B-IO*, *IO-LS*, *LS-CP*, *CP-C*, *D-E*, and *> E*, Figure 4. Upon completion of the analysis, the level of deformation could be seen from the output results on each hinge. Each level of behavior was assigned a corresponding weighted factor, x_i as shown in Table 3.

The analysis also enabled the obtaining of the number of formed plastic hinges in the beams and the columns of the structure. The columns were treated as elements of a greater importance for the global safety of the building wherefore they were assigned a weighted factor of 1,5 unlike the weighted factor of 1,0 for the beams, [2].

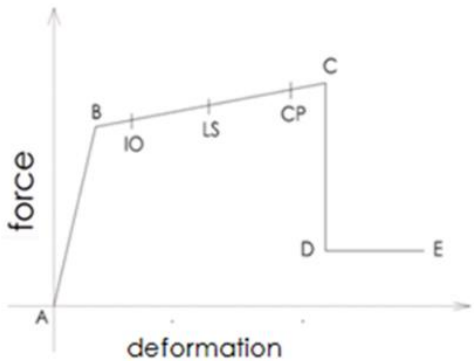

Table 3

Range	Factor x_i
<B	0
B to IO	0.125
IO to LS	0.375
LS to CP	0.625
CP to C	0.875
C-D, D-E, >E	1

Figure 4. Force-displacement curve for the plastic hinges

The evaluated transverse bearing capacity of the structures was compared with the designed bearing capacity, i.e., the values of the seismic forces for the structures designed according to the currently valid regulations with seismicity coefficients of VII, VIII and IX degrees that are relevant for the considered region of the Polog valley [1].

What can be observed in all structures is that there are considerable reserves of bearing capacity evaluated by nonlinear analysis, indicating conservatism of the currently valid regulations.

Table 4 shows the relationships between the designed values of seismic forces and the evaluated transverse bearing capacities of the buildings for

different seismicity coefficients. A considerable reserve of bearing capacity of the structures is evident.

Table 4. Relationship between the designed and evaluated bearing capacity of the buildings

Structure	Number of storeys	V_{IX} /Vp	V_{VIII} /Vp	V_{VII}/Vp
1	9	0,46	0,23	0,11
2	1	0,20	0,10	0,05
3	4	0,65	0,33	0,16
4	6	0,35	0,17	0,09
5	7	0,33	0,17	0,08
6	3	0,27	0,13	0,07
7	3	0,42	0,21	0,10
8	8	0,22	0,11	0,06
9	6	0,70	0,35	0,18
10	3	0,50	0,25	0,12
11	4	0,88	0,44	0,22
12	9	0,45	0,22	0,11
13	6	0,73	0,37	0,18
14	8	0,66	0,33	0,16
15	4	0,93	0,46	0,23
16	3	0,58	0,29	0,15
17	3	0,31	0,16	0,08
18	3	0,63	0,32	0,16
19	4	0,73	0,36	0,18
20	2	0,85	0,43	0,21

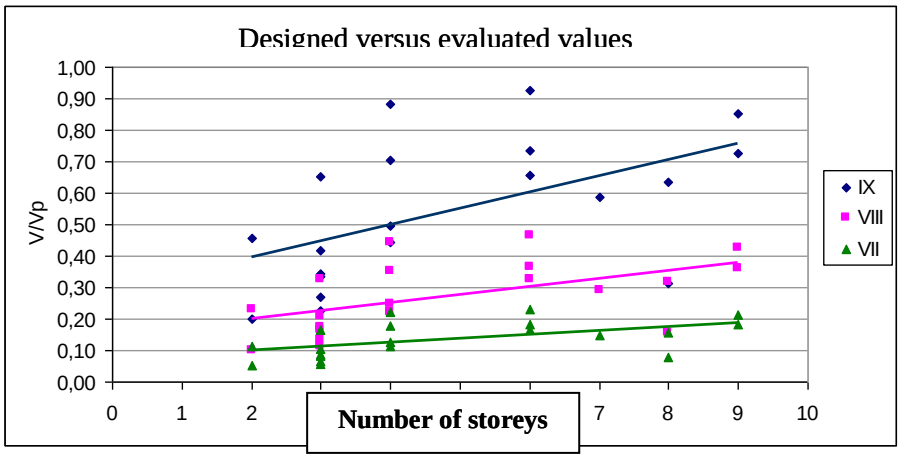

Figure 5. Relationship between the designed seismic bearing capacity and the bearing capacity evaluated by the "pushover" analysis for seismicity of VII, VIII and IX degrees.

A graphic presentation of the relationships between the designed bearing capacity and the capacity of the structures evaluated by nonlinear analysis is given in Figure 5.

Figure 6 shows the computed vulnerability indices for the buildings obtained by use of expression (1). It can be observed that the computed values of the vulnerability indices are considerably uniform and range within the limits of 0,2-0,45, [1].

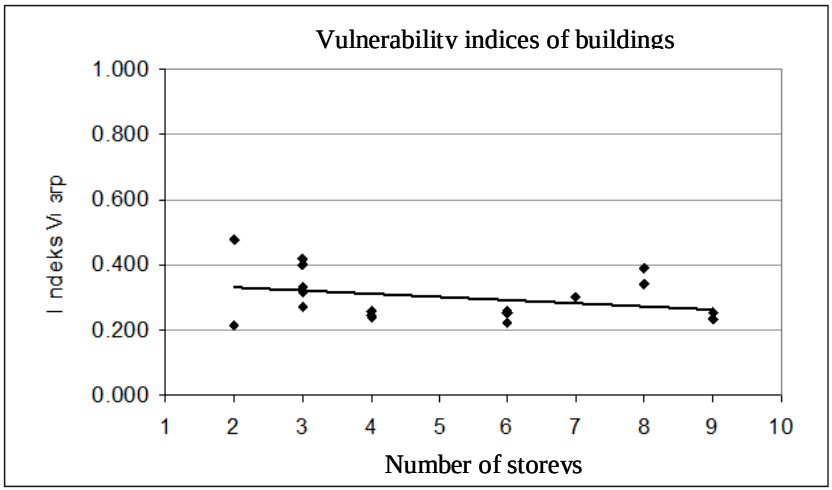

Figure 6. Vulnerability indices for the analyzed structures

The results from the nonlinear analysis and the data used for the computation of the vulnerability index refer to the analyzed building no. 3, representing an individual residential building with business premises, with 4 storeys (B + GF + 2). The building is structurally solved by reinforced concrete columns and beams. The floor structure of the building represents a reinforced concrete slab.

Figure 8 shows view of the structure and its vertical cross-section, while the plan of the characteristic storey of the building is shown in Figure 7.

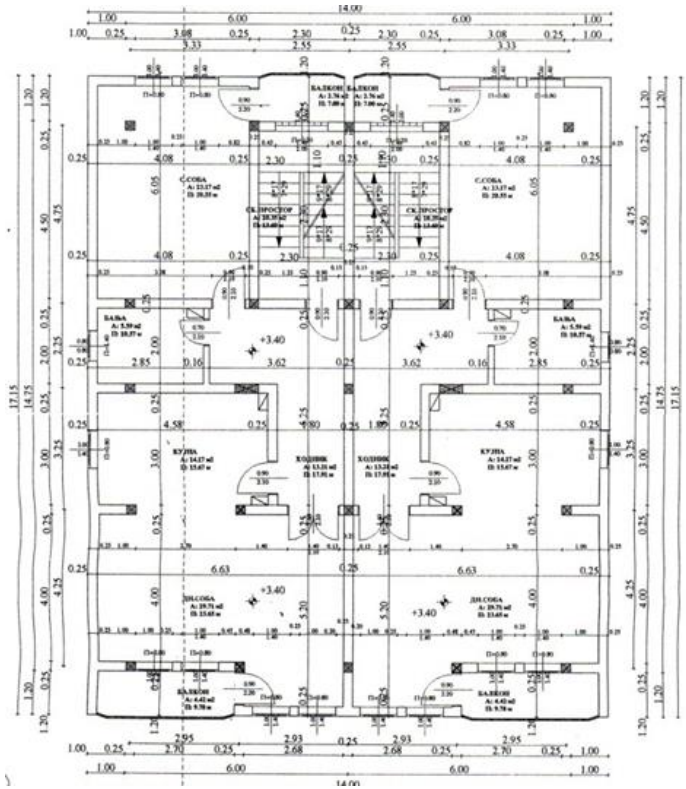

Figure 7 Plan of characteristic storey of the building

Figure 8. View and cross-section of the building

The obtained curve of transverse bearing capacity is shown in Figure 9. Presented further are the values for the computation of the vulnerability index of the same structure.

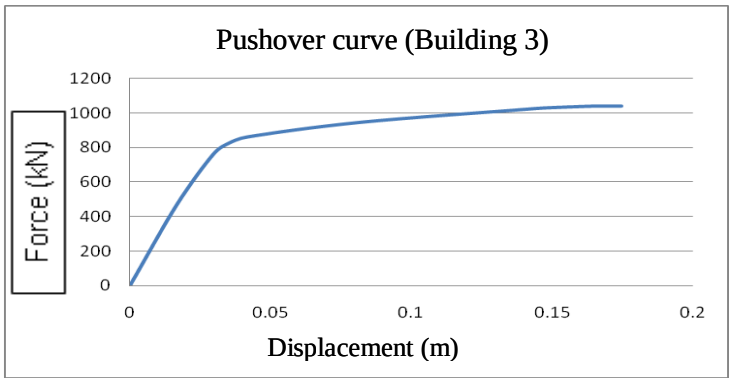

Figure 9: Pushover-curve for structure no. 3

Tables 5 and 6 display the values necessary for the computation of the vulnerability index of the structure (number of formed plastic hinges in the structural elements, columns and beams and the corresponding factors of nonlinear behavior).

Table 5: Number of plastic hinges formed in the beam elements of structure no. 3

Structure 3 – beams			
Plastic hinge range	Number of plastic hinges (N_i^h)	Factor(xi)	Ni*Xi
<B	515	0	0
B to IO	45	0.125	5.625
IO to LS	15	0.375	5.625
LS to CP	25	0.625	15.625
C-D, D-E, >E	40	1	40
Σ	640		66.875

Table 6: Number of plastic hinges formed in the elements – the columns of structure no. 3

Structure 3 - columns			
Plastic hinge range	Number of plastic hinges (N_i^h)	Factor(xi)	Ni*Xi
<B	325	0	0
B to IO	31	0.125	3.875
CP to C	17	0.875	14.875
C-D, D-E, >E	25	1	25
Σ	398		43.75

$$VI = \frac{1.5 \cdot 43.75 + 66{,}875}{398 + 640} = 0.128$$

The computed value of the vulnerability index of structure no. 3 amounts to 0.128.

CONCLUSIONS

From the performed analysis and the obtained parameters of behavior of the selected structures, the following conclusions are drawn:

- Most of the reinforced concrete buildings with 2 to 9 storeys behave satisfactorily. The bearing capacity of the buildings evaluated by means of "pushover" analysis points to the existence of considerable reserves in respect to the forces computed according to the currently valid regulations.
- The obtained values of the vulnerability indices of the buildings are within the limits of 0,2 to 0,4 with the exception of the buildings with irregularities at plan and along height for which values of indices higher than 0,45 were obtained.
- The nonlinear behavior of the structures is mainly through formation of plastic hinges in the beam elements.
- From the analysis of the deformed state of the hinges formed in the beams, it can be concluded that the conditions of these hinges range between B and IO. Until the occurrence of the first plastic hinges in the columns, the conditions of the hinges in the beams range between IO-LS. The analysis ends when the conditions of the hinges formed in the columns are in the range between LS-CP, corresponding to effective displacement of about 2-3% of the height of the buildings.
- A simple method that enables evaluation of the seismic vulnerability of existing RC buildings is applied. In this method, the capacity for nonlinear deformation of the structural elements of the buildings under seismic effects is taken into account.
- The proposed method is a useful tool for achieving this goal since it enables analysis of the vulnerability of ordinary buildings in a certain territory including data from different sources and of different preciseness. It should be pointed out that all the performed analyses were mainly based on data obtained from design documentation whereat possible deviations from these data in the process of construction is a situation that cannot be excluded. Hence, when applying the indicated methodology on individual structures, it is necessary to pay particular attention to the correspondence between the design documentation and the "as built" state of the structure.

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COMPETITIVNESS, INNOVATION AND GROWTH: THE CASE OF MACEDONIA

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SUMMARY

The purpose of this paper is to examine the close links among competitiveness, innovation and growth. The paper theoretically reviews the concept of economic growth based on technology and innovation that does not have diminishing returns, as well as examines how these concepts could work in a country like Macedonia. The paper concludes that Macedonia is still behind the technology frontier and it could benefit to a great deal from improved policy coordination and implementation of reform agenda aimed at increased competitiveness and innovation based growth.

Key words: Competitiveness, innovation, growth.

INTRODUCTION

A review of innovation literature suggests that due to the market failures, private investment in innovation is limited, making public intervention necessary and justified. For example, in the US, federal government is continuously providing support to three main pillars: basic research; top notch system of higher education; and infrastructure, including railways, highway system, broadband internet networks etc, areas for which private sector would not have invested adequately.

The process of innovation and knowledge absorption is not automatic; it requires a good investment climate, excellent education and R&D systems. In that sense, properly designed economic and innovation policies could have a major impact on the degree to which a country will rely its growth on innovation and the decisions of the firms to make necessary investments to innovate or absorb new technologies. Governments have an important role to play in promoting technology and innovation through direct support of

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UDC: 338.121:339.137.2(497.7)
338.121:001.895(497.7)

innovators and specific industries, and by creating such investment climate that is most conducive to innovation creation.

THEORY

Competitiveness, innovation and growth are closely related and intertwining concepts that have intrigued a number of economists for a long time. Competitiveness, which is a very complex and multi faceted concept, has been traditionally defined through the foreign trade indicators; nevertheless, the modern definitions of competitiveness at macro level are linked to the capacities of a state to achieve high level and sustainable GDP growth rates per capita. According to the World Economic Forum (WEF), competitiveness is defined as "a set of institutions, policies and factors that determine the level of productivity of a country."[1] Competitiveness is determined by numerous and complex factors and the WEF Global Competitiveness Index is one of the most reliable sources of international competitiveness analysis. Measuring productivity is not an easy task, particularly aggregate productivity, productivity of an economy or an industry. Productivity of labor is the most commonly used measure which shows how efficient is the labor combined with other factors of production. More sophisticated methods are used to measure aggregate productivity such as total factor productivity growth, multi factor productivity growth, and others.

Innovation is a key factor that determines improvements in productivity, competitiveness, and long term economic growth. A number of empirical studies in the last sixty years concluded that substantial share of growth in the income per capita is related to the growth of total factor productivity (TFP). This started with Robert Sollow and his empirical study measuring drivers of increases of U.S. output per person, concluding that a big part of this growth cannot be explained by increase in labor or capital inputs. This, so called Sollow's residual is closely linked to improvements in technology and technological change[2]. It is well known that expansion based on the same production process and same products cannot result in long term growth, since marginal productivity of capital diminishes and eventually stops the growth. Economic growth based on technology and innovation does not have diminishing returns. This is confirmed by economic history, having in mind that modern economic growth starts around 1800 with the industrial revolution and steam engine, prior to that, technology is stagnant and growth is very slow. In a similar way, innovation and technology could provide explanation of the big differences in economic growth and wealth of the nations.

There is no single definition of innovation, but according to OECD Oslo Manual, innovation is defined as "implementation of a new or significantly improved product (goods or services), or process, new marketing method, or new organizational method in business practices, organization of work place or external relations."[3] Every innovation has to include some level of novelty; it could be new to the world, new to the market, or new to the firm. This is a broader definition of innovation compared to the one used in the innovation literature in the nineties which viewed innovation as a radical innovation or new to the world only. Innovation can be made in every sector including traditional industries as textiles, or government services such as health, education etc. Still, science and research and development (R&D) are at the core of innovation since modern innovation is a result of scientific knowledge.

Innovation is frequently related to entrepreneurship, as entrepreneurs are typically people who could do new things, do more with less, or people who could get more by doing things in a new or different manner. (Jean Baptist Say[4]) In a similar way, Schumpeter defines entrepreneur as a hero, someone who creates new industries and triggers key structural changes in the economy. In this sense, Schumpeter defines innovation as "industrial mutation" that is revolutionizing economic structure from within, constantly destroying the old and creating new structure[5]. Schumpeter is the author who managed to put innovation at the center of economic growth theory.

ANALYSIS

In spite of the macroeconomic stability and low inflation rates from mid nineties until present, growth rates that Macedonia achieved since its independence have been disappointingly low, much lower relative to the other countries in transition. In addition, most of the growth achieved is based on low value added and labor intensive industries competing in the global economy on the basis of cheap labor and low taxes. Although improved recently, still weak competitiveness position of Macedonia (60) as indicated in the Global Competitiveness Index 2015 and other relevant analysis is a reflection of low level of productivity that has negative impact on the lower rates of return on investment and consequently lower growth rates.

Macedonia is behind the technology frontier, which means that there is a big potential for economic growth based on transfer of existing technologies, while encouraging innovation and creating new knowledge. Main channels for knowledge absorption are typically defined through trade, FDI and knowledge flows that allow diffusion of innovation and best practices to

other countries and private sector. Analysis of statistical information shows that R&D does not have a significant role in the economic growth model of Macedonia. Investment in R&D is very low and also has a downward trend. Total R&D expenditure in 2010 was only 0.14 percent of GDP, compared to 0.32 percent of GDP in 2001. On top of it, most of the R&D investment is done by public sector, without clear definition of priorities and goals of research and without criteria for financing and evaluating investments. FDI inflow, which has been at disappointingly low level throughout the twenty four years of independence, does not provide significant source of knowledge and technology. Raw materials and low value added goods dominate both the export and import side in the foreign trade model of Macedonia, making trade insignificant contributor to creating and diffusing of new knowledge. Moreover, Macedonian companies that decide to invest in production expansion and purchase new technology typically purchase very old equipment making products that do not satisfy quality standards required in the global market, resulting in non competitive companies that could only compete on the basis of low wages and low taxes. On the side of scientific output, situation is similar, with only 34 patent applications submitted to European Patent Office (0.1 patent per million population) and only 58 articles published in scientific and technical publications in 2009. [6]
Macedonia has not yet created a national innovation system according to UNCTAD definition[7], in terms of coherent set of policies that provides leadership, priorities, and framework for financing, monitoring and evaluation of research and innovation that stimulate and reward innovation. Elements of this system exist; however, they still do not function as a coherent system. In 2012 Macedonian government adopted Innovation Strategy Paper aimed at supporting innovation and growth for the period 2012-2020.
Different countries in the world have designed different approaches and methods to support innovators. This includes provision of various business services; incentives for entrepreneurs and new technology based firms; access to finance for innovation and its commercialization, particularly in the first stage of development; supporting networks and clusters, etc.

CONCLUSIONS

Macedonia ranks very high in the recent World Bank Doing Business Reports[8] (30 position in 2015) which indicates that regulatory and business environment reforms resulted in good investment climate. However, low growth rates, high unemployment, as well as low competitiveness show that these reforms are not sufficient or deep enough to increase Macedonia

productivity and living standard. To that end, Macedonian government should conduct an in-depth analysis of the reasons behind these failures and introduce a set of comprehensive reforms leading to increased productivity and competitiveness. More specifically, policies aimed at good governance, rule of law, strong competition regime, and prudent fiscal and monetary policies and institutions could be instrumental in these efforts. In addition, improved infrastructure could be used as one of the key elements for increased productivity of the companies and the nation; as well as measures to deepen the financial sector, which will allow increasing the level of intermediation and influence of the financial sector on the productivity of firms. Intellectual property rights protection system is very important element of business environment conducive to innovation creation, therefore, more emphasis should be put on the best ways of moving this agenda in terms of legislation and actual enforcement measures. Supporting basic research is very important having in mind all spillover effects on innovation and competitiveness of the national economy. Macedonia invests very small amounts in basic research, and given its resources it should narrow down the basic research areas. Well trained and educated labor has a key role in adopting of new technologies and adapting it with new knowledge, increasing productivity, and achieving strong competitiveness position of a national economy in the global markets, therefore this is another important area where urgent improvements are needed. Finally, better coordination of the numerous policy papers and strategies and actual and timely implementation of these strategies is of utmost importance.

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ENVIRONMENTAL RIGHT – INFORMATION, PARTICIPATION IN DECISION MAKING AND THE RIGHT TO ADDRESS THE COURT FOR ENVIRONMENTAL ISSUES, KNOWLEDGE OF THESE RIGHTS FOR THE INHABITANTS NEAR POWER PLANT "KOSOVA A" AND "KOSOVA B", MUNICIPALITY OF OBILIQ – REPUBLIC OF KOSOVO

Zymer MRASORI[1], **Ferim GASHI**[2*], and **Albert KOPALI**[3]

SUMMARY

In Kosovo, so far, there have been positive developments regarding environmental legislation framework, each passing day, this legislative framework has been developing in conformity with the situation and the possibility of human capacities of the country, but it is also worth stressing that a contribution during the composition of environmental legislation has been given by the EC, through technical assistance respectively TAIEX, the amendments made so far have been made conform governmental policies for environmental protection and based on the acquis communautaire and other demands of European Commission of the EU during the assessment of the institutions, through progress report.

National legislation in power should guarantee the right on environmental information, public participation in decision making and the right to address the court for environmental issues, according to the international conventions on environment, especially based on the Aarhus Convention which is without doubt one of the most important environmental conventions for the fact that it defends the principal rights of the environment.

Even though Kosovo is not a signing member of many international agreements, the responsible public institutions should work hard to ensure these rights in an efficient and effective way, because signing and ratification of these agreements in which these developments play key role and have a specific importance.

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However, in Kosovo there is a huge number of the laws approved by the Ministry, government and parliament, but we are too far from the implementation practice. Environmental right in Kosovo has its basis from the Constitution of the Republic of Kosovo, Law of Access on Public documents Nr. 03/L-215, Penal Code of the Republic of Kosovo Nr. 04/L-082, Law on Environmental Protection Nr. 03/L-025, Waste Law Nr. 03/L-160, Law for protection of Air from Pollution Nr. 03/L-160, VNM Law Nr. 03/L-214, Administrative Order Nr. 09/2011 Information for participation of the public and interested parties in procedures of evaluation on environment impact, Law for Chemicals Nr. 02/L-116, Law for Waters Nr. 04/L-147, Law for Nature Protection Nr. 03/L-233. The environmental right means access in all natural resources which enable survival of live organisms in biosphere, including earth, water, air, biodiversity, nature, food and habitats.

Key words; Environmental right, acquis communautaire, EU, Environmental legislation, Aarhus Convention

1. INTRODUCTION

Presently, humanity faces with a lot of problems. One of the main issues is the pollution and devastation of the environment. Many international treaties, conventions, protocoles, regulations, laws and decisions for environment protection were considered in the second half of the XX century. Innitionally, human rights were not mentioned, but since the 1970s the relations between human rights and environment took the progressive and the right path. During the period of 70s the world began to be aware of the problems that the environment was being threatened with and the fear of pollution in the near future. So, humanity began to understand and realize that a clean and healthy environment is essential for basic human rights. Such rights are; the right to live, to a personal integrity, to have a family, hence all the attendees of the meetings during that period of time had agreed upon a clean and healthy environment and sustainable development. It has been scientifically proven that, each species in depended on environment protection and life conditions, so why should we not take care of a healthy enironment?

The right on environment is a basic right and undeniable, since life itself is directly connected to the development of environmental processes. The concept of the right for environment information is shown in a clear way in international acts as the Aarhus Convention, but even on the Constitution of the Republic of Kosovo and other legal acts and subacts on national level. The promotion of environmental legislation and other laws remains a necessity of the environmental right, then raising the level of education and community awareness regarding the opportunities that national legislation

offers for the right of access to three basic pillars of the Aarhus convention; such as: the right to environmental information, the right to participate in key roles and the right to lawsuit. The fact is that, there is a number of unsolved cases regarding the right of information and the right of participation in key roles for environmental issues. All that disadvantage remains as lack of citizens' general knowledge regarding the right on environment, which means that if the first and the second pillars are implemented in general, there is not much to talk about the third pillar.

Our country faces with variuos environmental issues, problems which have been recorded on reports on the environment, waste material, air, nature, water and other documents regarding environment.

Even though Kosovo has not signed the Aarhus Convention, in one way or another, it is mandatorial for Kosovo to implement the Aarhus Convention. Initially, on implementation of the convention, Kosovo should begin with transposition of the Convention in national level.

International Convention on the research, is the Aarhus Convention, which deals with access to information, public participation in decision-making and Regulation to RA to court (Hallo, RE (1997). Kosovo is an interesting case, because it is a new country and has not signed or ratified this convention. To become part of the international convention, Kosovo should first and foremost be a member of the United Nations of the World. Citizens' access to information and environmental data that are of public interest held by public authorities is important for each environmental democracy. It establishes a bridge of communication between citizens and public authorities in environmental decision-making processes and enables citizens to participate in the process of developing environmental policies (NGOs and private sector), and have an active role in this process. (V. Morina 2006 March Pristina).

In the last decade, environmental issues in Kosovo, are beginning more and more to get the multidimensional status and we can say that conservation and environmental protection, has been permanent concern of humankind. Environmental problems in some areas are still quite unknown and the environment issues related to the protection of the trailer are strongly interrelated with each other and directly or indirectly affect the development and sustainable use of his own. In many conferences, meetings, roundtables, various workshops discussed a lot to this Convention, in terms oratorical can not say that nothing has been done, but in practice little has been done.

To facilitate its implementation, Convention clarified and defined a series of important concepts for, has detailed the scope and content. The information should be made available to the public in a transparent and progressive bank, through the electronic data and reports periodic (Baraku, Tirana 2013),

In formal legal terms, environmental democracy in Kosovo has begun to gain ground in recent years. Besides the Constitution, a significant number of laws and regulations outline the relationship between citizens and public authorities in the field of environmental protection and preventing its degradation. The importance of environmental legislation in Kosovo is manifold. First, the environmental legislative framework contributes to the protection of the right of individuals to live in an environment adequate to his health and wellbeing. Second, the environmental legal framework, enabling individuals and public access to environmental information, to participate in environmental decision-making and to address the court in relation to environmental issues, gives special meaning to environmental democracy. Therefore, citizens are not just spectators in the decision making process, but become actors influential in articulating give rise ESIM environment and in the prevention of measures / activities that can have a damaging effect developed in Kosovo. (Mahmutaj Veselaj, Morina, September 2013 Tirana).

2. METHOD AND MATERIAL

The method used in this research was The Access Initiative (TAI) is a methodology developed mainly for research, progress of implementation of the Aarhus Convention. The Acces Initiative method, is based on new questions or indicators that researchers use to assess the provisions of their governments for transparency and accountability in decisions affecting the environment (Kiss, C . et al. (2006). The method referred to in the context of research questions, indicators, and research tools (including guidelines on the selection and source documents) that are used to conduct a national assessment TAI for access right to be informed, participate in decision-making on environmental issues and the right to justice, but also research the situation and the need for capacity building. Assessment based on this method, refers to the process of country level performance in approximation of access to information, participation and justice, including the collection of data to answer research questions selected.

The method used in this research - The Access Initiative (TAI) is a global network that promotes access to information, participation, and justice. Environmental decision-making initiative in access network is the largest in the world dedicated to the civil society organizations to ensure that their community governments have rights and have the ability to gain access to information and participate in decisions that affect their lives and their environment. Members from all over the world have the opportunity to carry out advocacy, evidence-based to encourage collaboration and

innovation to develop transparency, accountability, and involvement in decision making at all levels. For issues of environmental rights protected by law, the right to environmental information, the right to participation in decision making and access to justice prey environmental issues, so with a word and environmental promotion of democracy in practice.

One of the gaps in research mainly on the collection of data was accurate dependency source of official and non-official. Another shortcoming was that other research methods are highly dependent on the ability of the researchers themselves. While priority during the research, the accuracy of the literature sources is the most efficient way to study and better rates and statuses (Marshall, 1989).

3. RESULT AND DISCUSSION

From the results obtained during this research can be concluded that local community of this part lacks basic on the right basis as follows usual environmental; the right to environmental information, the right to participate in decision-making and the right to tiu the courts for environmental issues.

Table. 1. The result of frequency responses and input from the community who lives near the power plant Kosova A, Kosova B, in the municipality of Obilic - The first pillar of the Aarhus Convention - the right to environmental information.

Replies	Frequency
Yes	295
Not	6 79
I do not know	136

In Table 1, it is clear that the answers given by local communities that have very little knowledge of the law to the courts for different issues of environmental disputes where it is presented in a table shows that 679 have answered " NO", while 295 have answered "YES".

Responses regading the first pillar-the right for environmental information and environmental issues from community - Obiliq, inhabitants near Kosovo A and B.

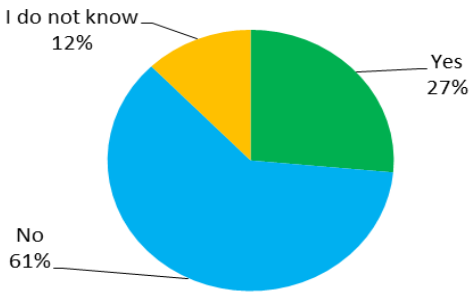

Figure. 1. The result as a percentage of the answers given by the community which resides near the power plant Kosova A, Kosova B, in the municipality of Obilic - community who lives near the power plant Kosova A, Kosova B, in the municipality of Obilic - The first pillar of The Aarhus Convention - the right to environmental information, by percentage on the implementation of the Convention on the environmental law, 46% said "no", 40% said "do not know" and 14% "yes", this result clearly shows that local community lacks knowledge about the right to participate in decision-making on environmental issues.

Table. 2. The result percentage and frequencies provided by the community which resides near the power plant Kosova A, Kosova B, in the municipality of Obilic - the second pillar of the Aarhus Convention - the right to participate in decision-making on environmental issues.

Replies	Frequency
Yes	155
Not	5 08
I do not know	447

In Table 2, it is clear that the answers are given by the community which resides near the power plant Kosova A, Kosova B, in the municipality of Obilic - the second pillar of the Aarhus Convention - the right to participate in decision-making on environmental issues, where it is presented in a table shows that 508 are answered ''No'', 447 have answered '' I do not know'', while 155 have answered ''YES''

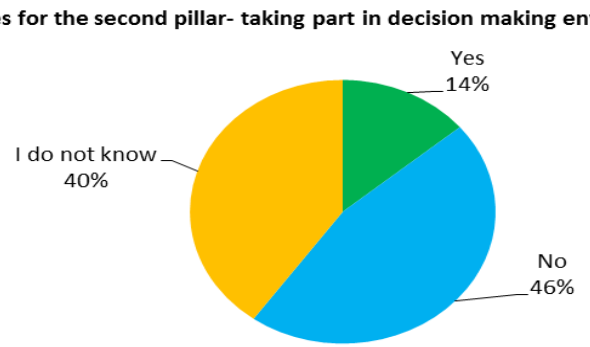

Figure. 2. The result as a percentage of the answers given by the community which resides near the power plant Kosova A, Kosova B, in the municipality of Obilic - The second pillar of the Aarhus Convention - the right to participate in ven dimmarrje on environmental issues, based on the percentage related to implementation the Convention on the environmental law course that 46% said no, 40% said do not know and 14% yes, this result is obvious that the local community lacks knowledge about the right to participate in decision-making on environmental issues.

Table 3. The result as a percentage of the answers given by the community which resides near the power plant Kosova A, Kosova B, in the municipality of Obilic - the third pillar of the Aarhus Convention - Access to the courts for environmental issues.

Replies	Frequency
Yes	159
Not	48 0
I do not know	471

In table 3, it is cleat that the answers given by local communities that have very little knowledge of tha law to the courts for different issues of environmental disputes where it is presented in a table shows that 480 are answers ‘’NO’’, 471 have answered ‘’I do not know’’, while 159 have answered ‘’YES’’

Graph. 3. The result as a percentage of the answers given by the community which resides near the power plant Kosova A, Kosova B, in the municipality of Obilic - the third pillar of the Aarhus Convention - Access to the courts for environmental issues, according to the percentage associated with implementation of the Convention on the environmental law course that 44% said no, 42% said do not know and 14% yes, this result clearly shows that local Communist lacks knowledge on the right to go to court environmental matters.

4. THE RIGHT TO ENVIRONMENTAL INFORMATION

We need to develop a practical guide concerning the right to information, online web , websites, newspapers, radio programs or information through TV, or written forms, newsletters and magazines ..

MESP should be Aarhus Information Centre, mainly in large cities.

Information centers must cooperate with environmental NGOs - in order to develop an effective and functional network where every institution is connected with each other and plays his role and contributes to the improvement of the right to environmental information.

It is necessary to inform the public and should be more information provided online, in relation to information on decision-making, environmental policies, strategic documents, plans and environmental programs, decisions as: decisions taken by the authorities regarding the public various permits

It is necessary to increase the level of complete information on the situation as; Water, Air, Land and Biodiversity, ie having environmental information online refresh pollution in daily, weekly, monthly and yearly.

More user-friendly information and interactive methods should be used to provide information and communication with the public.

4.1. The right to participation in decision-making

It should improve and facilitate the implementation of procedures of public participation, particularly in decision-making, in cooperation with operators and local communities.

MESP should ensure a stronger control of proceedings of public participation and public debate, seeking a review of standard reports, to provide relevant information, organize public debates, gather comments, evaluate the results of public comments, the participation should ensure that procedures be developed according to standards.

Development of a Practical Guide for Public Participation in Environmental Decision-Making for the implementation of the Aarhus Convention in Kosovo. There is a constant need for practical guidance and capacity building for authorities, entrepreneurs, local governments, the role and responsibilities.

Significant improvements are needed regarding public participation procedure in decision-making on specific activities, environmental policies, strategic documents, plans and environmental programs, decisions.

4.2. The right to justice

Avoiding financial barriers and other obstacles that should be avoided such as high court fees, expert fees and lawyers, the lack of free legal aid, lack of awareness and recognition of the rights of the Aarhus Convention by the judiciary and the lack of public interest lawyers on environmental issues.

Generally more support is needed with great institution responsible for a more effective implementation of the Convention - interagency cooperation.

The increased demand for support through projects, the demand for technical support from the Secretariat UNECE or by TAIEX - European Commission or by other donors. In the moment of establishing a national coordinator for the Aarhus Convention, may be initiated mutual cooperation between the Ministry of Justice, Basic Court, Ombudsman, environmental NGOs and Civil Society to draw their attention to the role they have in the implementation of the pillars of the right to address the court in Aarhus Convention and reducing barriers to raise awareness of the requirements for the right to justice of the Convention.

Practical solutions should be considered to reduce the financial barriers and other obstacles (such as demand for the removal of administrative tax court for NGOs, can be included in the environmental provisions of the new Law on Environmental Protection).

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OVERVIEW OF THE ENIRONMENTAL POLLUTION IN THE CENTRAL AREA OF KOSOVO, THE MUNICIPALITY OF OBILIQ

Sami RESTELICA[1]

SUMMARY

Central part of Kosovo, which is the municipality of Obiliq, is one of the most polluted environment in the Republic of Kosovo. The source of environment pollution in this area are: industrial (Powerstations "Kosova A" and "Kosova B"), coal heating and drying plant, surface mining, release of nitrogen and other gases . During the electricity production in powerstations, the burning coal releases chemical gases in the form of smoke and dust through the chimneys into the atmosphere, which has caused general pollution of air, water and land degradation. The environment pollution is also caused by inner burning of coal in surface mining where as consequence of this occurrence dense fog is present, especially during the time period when humidity is high, in autumn and winter. The present fog (smog) during autumn and winter contains toxic gases.
In the municipality of Obiliq, the regional landfill from households waste material present in this area. As a result of the pollution, inhabitants of this area suffer from different illnesses such as: respiratory, cancer, cardiovascular disease, eye and lung problems, high blood pressure and asthma. However, this work will deal with the concept of pollution, air pollution, and the source of pollution, land degradation and its cause, the impact of the pollution on the inhabitants of the municipality of Obiliq, central part of Kosovo.

Key words: environment pollution, Obiliq, electricity production

1. INTRODUCTION

By pollution we understand the unwanted change of physical, chemicl or biological features of the environment components, air, water and soil, which negatively influence on people and other organisms in their life

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conditions, in their industrial production, in cultural-historical objects, etc (I. Ramadani, 2011, page 217). Environment pollution may be done by the action of harmful components in three ways: with components that biologicaly are broken down into non toxic, with components that in biosphere cannot broken down or are slowly broken down and with toxic matter. In the group of substances that can be broken down biologicaly are the urban and animal farms waste water. Their common characteristics is the rapid and entire decomposition to the simplest components like, carbon dyoxide and nitrates. The second group of the pollutants that cannot be decomposed or can be decomposed easily are: metals, plastic, detergent, phenole, etc.

In the third group of pollutants take part: heavy metals such as, mercury, cadmium, pesticides lead and other components that are used in industry and agriculture, etc. In this group we can add radioactive matter which is more and more active in the biosphere, then harmful gases of strong particles in the air which are led by smog in the cities. A part of this polluting material gets through the food chain to the human organism. Its action is often chronical and is usually manifested after a long time (I. Ramadani, 2011, page 218).

2. MATERIAL AND METHODS USED

In order to make this study possible, different throretical and practical methods were used. Methods used in this study are diverse and contemporary such as research method, observation method and direct terrain method, comparison method, cartography method, etc.

Data collection was realised through the use of broad literature on identification of main environment pollutants. Different direct onsite visits were done through personal expedition in the study area. This has helped to have a thorough sight of the polluted area and how to identify actual problems, such as, environmental pollution which the population faces with. This has led to the fact that often by onsite observation, there was official inconsistency of information or nondeclaration of main problems regarding environmental pollution.

GIS teachnology has been applied in order to present cartographically the environmental pollution problems. Realized analysis through this technology with overlaping of concrete layers has enabled the accurate destination of environment pollution.

3. AIR POLLUTION AND ITS SOURCES

The air is considered polluted when in it there are substances, which are unknown for its natural composition. The rapid development of industry, energy, communication technology and other human activities is continuously followed by the occurrence of pollution and environment degradation. (I. Ramadani, 2011, page 229). Coal as a combustible substance, began to be used in the XIII, while oil in the XX century. These substances release a quantity of polluting material (Co,Co2 etj), (I. Ramadani, 2011, page 218) while burning and causing damage to the environment.

Air pollution in Obiliq is very high; where it involves a vast number of gases like: sulphur oxide (SO), nitrogen oxide (NO), carbon dyoxide (CO2) and other organic compounds (ammonia, sulphates, hydrogen, etc) being shown in table 1 and 2.

Table 1: Air pollutants from power plants

Air pollutants from power plants	Year 1989
Compounds	Ton/year
Dust and ash particles in the air	100.000
Nitrogen oxide (NO)	18.000
Sulphur oxide (SO)	36.000
Carbon dyoxide (CO2)	7.500
Different compounds	10.000.000

Source: Ramadani, I., Ndikimi i eksploatimit sipërfaqësor të thëngjillit në mjedisin jetësor të Prishtinës,Tiranë, 1999

Table2: The degree of air pollution in February-August 2004

Pollutants	Unit	February	March	April	May	June	July	August
SO2	Migr/m	84,04	77,33	76,01	115,63	124,87	102,09	117,42
Soot	Migr/m	26,6	31,66	18,04	19,74	12,04	8,66	13,30
Air particles	Migr/m	/	/	71,52	125,93	94,42	86,81	101,76
Dust sediments	Mg/(md)	470,44	366,26	410,4	870,02	389,42	432,86	1004,38

Source: Instituti Inkos, Obiliq, 2004

Picture.1. Combustion of coal in surface mining

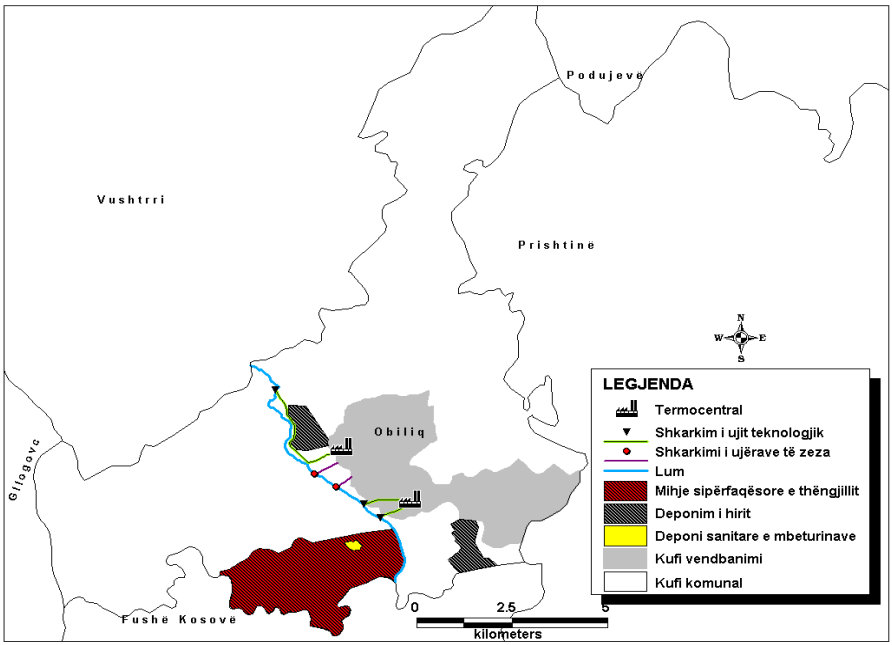
Air pollution is caused by coal combustion in surface mining (picture 1), where as consequence of this occurrence, dense fogs are present especially during the time when the air is humid, in autumn and winter (I. Ramadani, 1999)

Picture.2. Environment pollution from power plants

Pollutant is the landfill situated in Mirash (picture 3). In this landfill fire is set, which covers a vast part of the landfill.

Picture .3. Sanitary waste landfill in Obiliq

From the landfill, there is continuous smoke and gas release, harmful for the people and the environment. The sanitary landfill for the region of Prishtina, located in Mirash, Obiliq, was built in 2005 with the help of European Agency for Refonstruction. The landfill has an area of 40 ha (AKK, 2009) and was designed to make the collection of household waste material from the municipality of Prishtina, Obiliq, Lipjan, Fushe Kosovo and Gllogovc. It was also designed to have enough capacity for the waste with a capacity of total 3.500 000 m^3. Responsible for landfill management is the company for managing Kosovo landfills-KMDK, whereas responsible for collecting waste and transporting it to the landfill is the regional company "Pastrimi". The landfill of Mirash, is not managed properly and as a result it is jeopardizing th environment, water, air, soil and flora. "The company does not do its daily services like collection of garbage, waste compaction and their cover." (Municipality of Obiliq, 2013)



Map.1. Location of air, water andland pollution in Obiliq

Another problem is that in 60% of the settlements of this municipality the organized collection and displacement of waste service of does not function. Waste is thrown out in the fields, unused space, by the river banks, local and regional roads and streets and as a consequence of this action illegal landfills are created with negative impact on the environment.

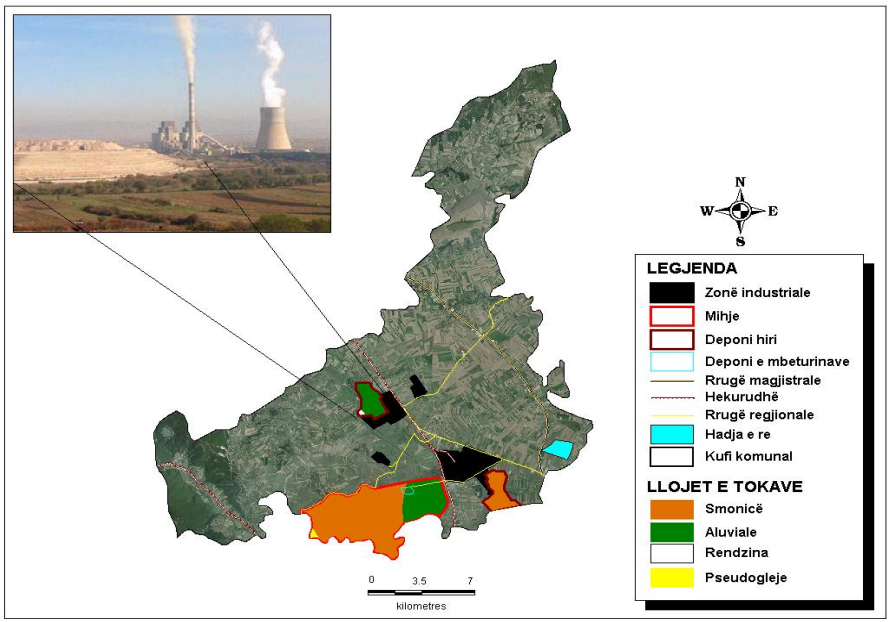
4. WATER POLLUTION AND ITS SOURCES

Regarding its origin, pollution may be categorized in: urban, industrial and agricultural pollution. In the water various pollutants may be found: household waste material, infectious agens, different agricultural fertilisers, erosion layers, radioactive subtrates, etc (I. Ramadani, 2011, page 250).
Pollution may be categorized in three ways: physical, chemical and biological pollution. Physical pollution includes differences of elementary physical characteristics for water organisms and generally for the possibility of water utility like: temperature, transparency, radioactivity, etc. Chemical pollution is based on the broad spectrum of chemical agents with which disrupt some of the elementary natural characteristics of the waters like: pH value, mineral composition, the amount of dissolved oxygen, taste, smell etc. Chemical pollution is divided in: organic and inorganic pollution. Inorganic chemical pollution means: acid pollution, heavy metal (mercury, arsenium, cadmium, mangane, chrome, etc) . Biological pollution means water pollution with bacteria, viruses, fungi and other organisms, which cause or carrier of various diseases (I. Ramadani, 2011, page 251). Water pollution in this area is enormous, especially surface waters. Technologic waters that are released after technological processes and without any special treatment, are discharged in river Sitnica and this pollution includes the following composition: sodium hydroxide, nitrogen composition (nitrates, ammonia) and phenole. For instance, "Kosovo A" power station, releases 130m^3/ of polluted water per day, whereas "Kosovo B" 750m^3/ of polluted water per day (I. Ramadani, 1999). Sitnica river is the most polluted river in Kosovo, which in the western part of the settlement river overflows from its bed and floods an area of 80ha (AKK, 2009). Regarding sewage network, the city has access to sewage network that is very old and presently does not fulfill the conditions. Eventhough some intervention were done recently, yet, problems in the network have not been avoided. All the sewage waters from the system, individual and collective, are discharged directly in Sitnica river without any prior special treatment. When sewage water and water in atmosphere are met, there is a pandemic possibility .

5. LAND DEGRADATION AND ITS CAUSES

Land (soil) is defined as a schist part of the Earth's crust, which consists of mineral particles, organic matter, water and air. Land is a nonrenewable resource and functions as an important part of peoples's life. It provides with

food production and protection of the other biomass, filtering and transformation of many matters including water, carbon and nitrogen (I. Ramadani, 2011, page 262). Land degradation of this area is mainly done by the ash which is stored in two landfills, one in Krushevc that takes an area of 100ha and while the other is situated in Plemetin that takes up an area of 84ha. (AAK, 2009). The continuous exploatation of surface lignite and its use to produce electricity, is followed by drastic difference of the configuration (morphology) of the terrain, in which a whole new landscape has been created, which is an entire degraded land in the municipality of Obiliq. Before exploatation of lignite began, this area was dominated by agrarian landscape with cultivated plants nearby Sitnica river.



Map.2. Land degradation and its forms

Based on pedological map of Kosovo and Orthophotos of 2009, we understand that in this area, land/soil has a high bonity scale. Identification of kinds of lands (map 2), that have been occupied by surface mining, ash disposal and areas under industrial area in hectares is as follows:

- Industrial area covers a total area of 287 hecatres, from that 141 hectares are aluvial soil, 131 hectares of smonica and 10 hectares rendzina.

- By surface mining in the municipality of Obiliq, 778.9 hectares have been degraded, from it 585.3 ha is smonica, 186.6 ha aluvium and 7 ha pseudogleys.
- Ash disposal from the powerplans covers an area of 184 ha where from it 98 ha is smonica, 81.66 ha aluvium and 5 ha is rendezina land.

The conflict of industry and agriculture is a process in this municipality. The expansion of surface mining is being done in the direction of west villages of this municipality, Siboc and Leshkoshiq, regardless of Hade village which is almost dislocated entirely. A new location of 83 ha in Obiliq, near the village of Shkabaj (Orlloviq) has been set to start building of a new settlement called "Hade e re". (map.2). The overall cadastral area of the municipality of Obiliq is 106 km^2. From this we find that 12% of the cadastral area of this municipality is taken and degraded by industry.

6. IMPACT AND INFLUENCE OF THE POLLUTION ON POPULATION

The citizens of this area are most in danger of diseases caused by coal burn. Many citizens that live in the area of powerstations complain about different respiratory problems, cancer, cardio-vascular diseases, eye infection, etc. According to the gathered data in the Central University Clinic of Kosovo and regional hospitals, the scale of diseases in respiratory organs in population living in the municipality of Obiliq is 30%, or half higher in comparison with other municipalities, whose average is 14.26% (Instituti i Mjekësisë së Punës dhe Mbrojtjes Radiologjike, Obiliq, 2012). In the first half of the year 2012 ther were six cases of people with cancer in this municipality. During 2012, 57.520 patients sought help in the primary health care in Obiliq. The municipality of Obiliq has 21.549 inhabitants, which means that most of the population has visited primary health care more than twice a year (Drejtoria e Shëndetësisë, Obiliq,2013).

7. CONCLUSIONS

For a clean environment, the powerplant "Kosovo A" needs to be closed down due to the fact that it is old and ongoing failure, air, soil and water pollution, which would influence directly in health improvement of the inhabitants of this area. Investment in health is not just a local but a national

problem. Serious intervention of the state in this area is more than necessary and urgent.

Regulation of Sitnica riverbed would avoid river overflow from its bed and flooding of the city in the west by the polluted water.

Removal of the regional landfill waste from the territory of this area would improve air quality. During this process it is very important to protect agricultural land of high quality by not letting construction companies build blocks of flats without planning and from the Electricity Corporation , on the other hand . To avoid completely sewerage problems, by not allowing any precipitation and wastewater to meet together in order to prevent any possible outbreak. In any space of Kosovo as in this area, there is no more need to constantly plan green spaces within the city, as well as in new areas that are planned to be built. From this research we can conclude that the hopes for a clean and functional space are too small for the residents of this area.

RECOMMENDATIONS

- The municipality should compile concrete plans to monitor the air with European standards and find suitable location for this purpose.
- To build facilities for treatment sewage before it is discharged to the river Sitnica.
- To clean waste from illegal landfills near the banks of the rivers, fields and free spaces.
- To intervene in the sewage system of all locations where it comes into surface.
- To absorb donations for recultivation of the degraded land by coal exploatation.
- To protect high bonity land from village dislocation from areas with high national interest.
- To compile plan-projects for reusing and recycling of waste.
- The government should compile projects for fire prevention in the lignite surface minings.
- To monitor technological water in the discharge points.
- To maintain water dreinage from ash dumps.
- In a rigorous way, the plan for remediation of the environmental state in the sanitary landfill of the waste until it is closed down should be implemented.
- To monitor the process of ash removal from the power landfills into the mining pits that is assisted by the World Bank.
- Power plant “Kosovo A” should close by 2017

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ENABLING SUSTAINABLE GROWTH THROUGH THE IMPLEMENTATION OF EU 2020 STRATEGY-IS IT VIABLE?

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and **Jasminka VARNALIEVA[3]**

ABSTRACT

The Europe 2020 strategy, adopted by the European Council in June 2010, aims at establishing a smart, sustainable and inclusive economy with high levels of employment, productivity and social cohesion. The key objectives of the strategy are expressed in the form of five ambitious targets in the areas of employment, research & development (R&D), climate change & energy, education and poverty reduction, to be reached by 2020. However, being on the half-way to the targeted period, many European countries, very likely will not be able to meet this benchmark in 2020.
The paper analyses the main weakness of the EU 2020 Strategy, trying to suggest the main points of intervention, in other to get countries closer to targeted criteria and find the way out from the debt crisis.

Key words: economic growth, unemployment, poverty reduction, research& development

INTRODUCTION

The sustainable growth is very much related with level of employment, poverty reduction, competitiveness trough innovation and education as well as effective use of natural resources. All of these areas are tackled in EU Strategy 2020 criteria and their fulfillments are subject to uncertainty in the current crisis. Namely, the growth prospects of all Member States, whether they are currently in the Euro area or not, depend on dealing decisively with the sovereign debt crisis and demonstrating that the Euro is a stable and strong currency whose members are determined and capable of implementing sound economic policies. Given the risk aversion in financial markets, these issues are not yet settled. In fact, too much political time and energy is being spent on emergency measures and not enough time is being

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devoted to implementing the policy changes that will bring the EU economies back to higher growth levels. This impose the question whether the EU 2020 Strategy criteria are achievable and well targeted, so to assure sustainable growth and thus help EU countries to get out of crisis?

THEORY

EU 2020 Strategy is a single common Strategy for all Member States, based on the idea of a truly sustainable economy, placing forward a comprehensive approach to development, addressing three key dimensions:
the economy, the environment and social policy.
Therefore, the Strategy determines a set of binding targets to be achieved by 2020:

- 75% of the population aged 20-64 should be employed.
- 3 % of EU GDP should be invested in R&D.
- The »20/20/20« climate / energy targets should be met (including an increase to 30% of emissions reductions if the conditions are right).
- The share of early school leavers should be under 10% and at least 40% of the younger generation should have a tertiary degree.
- 20 million fewer people should be at risk of poverty.

European Strategy does not prescribe a GDP growth rate and focuses on specific targets related to its three priority working areas. This might be the result of the failure of the Lisbon Strategy: it proposed a 3% common annual growth rate, but for individual countries it was a fairly abstract target. As it was discussed, this was one of the main reasons why the Lisbon Strategy failed to deliver and further progress is now being threatened by the economic crisis.
The 2020 Strategy is the EU's development plan was launched with the goal of »emerging stronger from the crisis« which was still present in 2010. As the global downturn has demonstrated, the EU's growth is linked closely to the performance of other countries and regions. Consequently, whether the 2020 Strategy is able to deliver results depends not only on regional policies and measures, but also on how it deals with the global context.
In November 2014 , The European Commission announced a € 315 billion Investment Plan to get Europe growing again and get more people back to work. The Plan is built on three main strands:
- the creation of a **new** European Fund for Strategic Investments (EFSI), guaranteed with public money, to mobilise at least € 315 billion of additional investment over the next three years (2015 - 2017);

- the establishment of a credible project pipeline coupled with an assistance programme to channel investments where they are most needed;
- an ambitious roadmap to make Europe more attractive for investment and remove regulatory bottlenecks.

According to European Commission estimates, taken as a whole, the proposed measures could add € 330 - € 410 billion to EU GDP over the next three years and create up to 1.3 million new jobs.

ANALYSIS

Despite the strengths of the Strategy, it might be considered that it lacks ambition and a clear strategic vision. When defining its medium-term goals the EU could have taken the opportunity to put Europe back at the forefront of social, political and economic change by putting forward bold and innovative approaches to development. Instead, the Strategy has neither managed to go beyond existing agreements nor considered alternative growth models or trade policies.

One of the main drawbacks is that the contents and structure of the Strategy are extremely inward-oriented, which limits its outreach potential and relevance in a globalised world. The Strategy is supposed to set a path towards a sustainable economy with regard to which it must be considered that recovering from economic crises is no longer a purely national or regional issue, but heavily dependent on the performance of other major economies in the world. A comprehensive development strategy needs to take account of the realities of the global economy. This might draw us to a conclusion that, the *Europe 2020 Strategy is unlikely to help the EU reclaim its role as a leading global economic and political player*. In order to overcome this weakness, it is important to implement the Strategy alongside a set of comprehensive and coordinated international policies.

There is also an issue increasing differentiations among the EU countries. While some of them like Germany and Netherlands kept the same rating and are good in servicing public debts, many of them (Greece , Portugal, Italy, Spain) are facing with the public debt significantly above their annual GDP . These create problem in coordination in accomplishing required Strategy's targets.

Together with a lack of coordination and binding targets, one of the main reasons for the lack of results in current implementation of the Strategy are that the *targets set by the EU are pretty vague and partly inadequate measures of progress and prosperity.* It is also remarkable that the development plans suppose to have more targets in number than the current EU Strategy. The 2020 Strategy discusses some of the crucial issues, but it

includes only three social targets (reducing poverty, increasing employment and reducing school drop-out rates), compared to the more than 30 targets set by the BRIC countries for instance. While Europe clearly has a considerable lead on these issues, without targets it is difficult to measure progress or to adopt specific actions to ensure a better quality of life for all Europeans.

The challenges in implementing EU Strategy 2020 targets

Despite all integration efforts, extreme asymmetries remain between EU member states in areas such as employment and income, which are in direct correlation with sustainable growth of EU. At the same time, several countries are putting the brakes on further unification and convergence and are pursuing independent policies on issues such as immigration.

In this context, there are wide-spread doubts among other global actors concerning whether a collective European development strategy would have enough support to deliver on its objectives.

The worldwide economic and financial crisis has been blamed, to a significant extent, on the deregulation of international markets and financial sectors. Not only does the EU 2020 Strategy fall short of offering an alternative to the existing system, but more importantly, it does not pay sufficient attention to the role and regulation of the financial sector in general. This could prove a major flaw and undermine implementation.It is obvious that the financial sector was instrumental in bringing about the crisis and many have complained about the preferential treatment given to this sector while ordinary people bear the brunt of the crisis. Many people believe that financial stability has been brought about with public money, while the financial sector has not contributed its fair share to the process. It is likely that European citizens are expecting some of these issues to be addressed within the Strategy – otherwise, popular support for the Strategy might be eroded.

Serious concerns have been raised about funding for the Europe 2020 Strategy. The document puts forward ambitious targets that will require significant investments, but till the end of 2014 it hasn't had contemplate any new funding instruments, leaving the EU budget as the sole source of funding. At the same time, across the European Union, Member States are tightening their budgets and cutting spending in order to fight the crisis. If the austerity measures put pressure on the European budget, the combination of the lack of new funding instruments and smaller budgets could jeopardise implementation of the Strategy. Yet, although there is significant effort by the EU Commission to make Europe more attractive for investment trough the *new European Fund for Strategic Investments* (EFSI), some positive

effects might be visible (or not) after the period of 4-5 years. On the other hand, the access to finance of this Fund envisage strict rules and high standards for entities' eligibility which implies that only the best will get the benefit of it , which might even more brother the gap among the EU members .

This also confirms the general opinion that the EU 2020 Strategy, in comparison to the previous Lisbon Strategy, implies a shift from market to political objectives. Very often, this also entails a similar shift from market to political incentives, which are usually provided with public money and can adopt different forms including subsidies and similar instruments. In a situation of limited funding, however, it is important to ensure that political priorities are self-sustainable in the long term from a market perspective. If political objectives can't be supported by market incentives in the long term, the whole process could result in a waste of taxpayers' money.

Specific issues related to implementation of the EU Strategy 2020 in debt crisis period

In order to achieve the targeted criteria and indicators as well to assure sustainable growth each of the EU countries need to take appropriate measures towards : fiscal consolidation , establishing better lending policy for enterprises in order to increase economic growth, , create the new jobs especially for youth through better education process and decrease general rate of unemployment , as well as increase the funds for researches and innovation and invest in energy efficiency and new renewable energy resources.

Fiscal consolidation

Determined fiscal consolidation is essential in order to restore macro financial stability as a basis for growth and stabilization of the European future. Therefore the EU countries need to be focused on broadening the tax base of certain taxes and thus increasing revenue or reducing high tax rates. The latter, practically seems to be just opposite in the practice nowadays, since most of the EU countries (as measure against financial crisis) have already increased their tax rates (VAT , personnel or other taxes), which make additional burden to the economy and citizens which are facing the threat of poverty more than ever.

In fact, the Governments debt levels have increased markedly over the past years as a result of the crisis , and what is more important , the internal public debt has significantly increased in past few years . This means that the state budgets of many EU countries are credited by the real sector, which

additional worsens the chances towards improvement of the economic growth in each of these national economies. In line with the agreed EU approach, although significant steps have been taken to consolidate public finances, based on unchanged policies, public deficits are continuously increasing and the pressure of higher taxes is stronger.

Supporting economic growth trough improving lending policy

A healthy financial system and, in particular, a robust banking sector support growth. The bank excesses leading up to the crisis have resulted in a widespread fragility in the sector and now risk acting as a brake on economic recovery. Restoring investors' confidence will require a strengthening of banks capital positions and measures to support banks access to funding, and will help to sever the link between the sovereign crisis and the financial sector.
Therefore the Commission considers that priority should be given to:

- Strengthening of the capital positions of systemic banks where required in order to reflect heightened risks in the sovereign debt markets.
- Facilitating bank access to term funding by implementing temporary measures , so as to limit the impact of banking sector reform on the flow of credit to the real economy, avoiding the risk of further tightening credit conditions.
- Creating a specific regime adapted for SME growth markets allowing them to be more visible to investors and subjecting SMEs to proportionate listing requirements. Prudential rules should also be reviewed to ensure that they do not unduly penalize lending to SMEs.

The fact is on the other hand, that the banks in most of the EU countries are facing the problem of worsening their credit portfolio, and therefore they are continuously reviewing their credit policies, tightening the rules for loans and even more increasing the ratio for collaterals which is problem especially for SMEs work.
Although the newly adopted Investment Plan envisage to inject over 300 million euro of public money in the real economy through the creation of a transparent pipeline identifying viable projects at EU level, the criteria should also engage the most advanced , the strongest companies from the most develop EU countries to get the most of the funding again deepening the gap between developed and less developed EU countries and ruining the EU principle of cohesion and equal development . It is even more likely that the SME from les developed EU countries will stay out of the race for the promised "financial cake " .

Increase of employment and competitiveness through better education and scientific research

Due to the recent global crisis, unemployment has increased with 23 million people unemployed in the EU today. The crisis is precipitating major shifts across the economy, with business undergoing fast restructuring, many persons moving in and out of employment and working conditions being adjusted to changing environments. Thus, the share of long-term unemployed has increased, with risks of falling permanently outside the labor force.

A particular focus is needed on young people, since the total number of young (under 25) unemployed in the EU increased by one million – making it one of the groups that have been worst affected by the crisis. EU-wide unemployment rate has increased to over 20%, with peaks of more than 40% in some Member States. This group also faces other structural challenges, hindering their integration into the labor market. For instance, 40% of young employed persons work on temporary contracts. Moreover, one out of seven (14.4%) currently leaves the education system with no more than lower secondary education and participates in no further education and training.

It is important that European policy-makers understand that the quantity and quality of education will play a key role in maintaining European competitiveness. In the area of education, the Europe 2020 strategy envisages reducing the early school leaver rate from 15% to fewer than 10%, whilst increasing the percentage of the population aged 30-34 who have completed their tertiary education from 31% to at least 40% by 2020.

Reducing the number of early school leavers should be considered crucial because the lower educated population faces lower employment rates, while the second target is particularly crucial since education plays a key role in employment and competitiveness by increasing employability and by fostering long-term growth. Although much improved the statistics show significant differentials among the EU member states related to fulfillment of these criteria. While many of the EU countries already reached or are close to reaching the goal of reducing early school leavers to 10%, the four countries : Italy, Spain, Romania and Bulgaria are still above the targeted level.

In the area of tertiary education, the Europe 2020 strategy calls for reaching a 40% graduation rate in every EU 28 country. The distance to this goal differs widely from country to country. While the graduation rates in Luxemburg , Ireland and France are 66%, 60% and 50% respectively , the same indicator in Italy and Romania is about 26% , while Czech Republic,

Hungary, Croatia . Austria, Bulgaria, Malta and Latvia are still bellow the targeted level(between 30-35%).
Anyhow the biggest investment in the future growth supposed to be the investments in research in development which were targeted at the level of 3% of GDP according to EU 2020 strategy. In particular this indictor shows the biggest failure among the countries. Namely , only Finland and Sweden spent 4% of the GDP on research and development , 8 countries has already reached the target , and the rest eighteen countries have invested from 0,5% to maximum 2% of their GDP in this important area. The situation is the most dramatic in Cyprus, (0,5%), Czech Republic (1%), Slovakia and Greece (1,2%), Bulgaria, Croatia, Italy and Latvia (apx 1,5%) and Hungary, Lithuania and Poland (1,7-1,9%). It is important to say that even the highest developed countries (IK, France, Germany, Denmark) over the crisis period has barely reach the targeted rate of 3% , while Luxemburg has not fulfilled the criteria spending on research and development 2,3%.
This situation might have even worse implications on the future growth and development in the EU countries, especially less developed ones, which needs even more investments than the targeted 3%. . The current EU Programmes (Horizon 2020 and The Programe for competitiveness and innovation COSME) based on excellence are too complicated to apply and require good established network predominantly led by the most outstanding institutes from the first five most developed EU countries . Therefore if the EU wants to achieve balanced development and decrease the gaps in economic growth among the EU countries need to facilitate the financing of the research projects, especially those coming from the less developed EU countries .

Other aspects to be considered

In addition to economic realities, the social tissue of the EU is being put to the test. The crisis has disproportionately hit those who were already vulnerable and has created new categories of people at risk of poverty. There are also clear signs of increases in the number of people at risk of income poverty, notably child poverty, and social exclusion, with acute health problems and homelessness in the most extreme cases. People with no or limited links to the labor market – such as pensioners or vulnerable people dependent on social benefits, for instance single parents – are also exposed to changes affecting the calculation and eligibility of their source of income.
An emphasis on resource efficiency, for example in areas such as energy efficiency and reducing waste, can improve competitiveness, create new jobs and help our environment. Reforms which improve the business environment and competitiveness should also be a priority.

At the end, it is the fact that EU economies are fragmented and with different economic level, which prevent the EU firms to grow and enjoy the same economies of scale and therefore have unequal access to finance as well as innovation capacities or regulatory obstacles which effect on structural reform processes, without which, medium term projections point to the EU remaining stuck in slow growth.

CONCLUSIONS

The sustainable growth is very much related with level of employment, poverty reduction, competitiveness trough innovation and education as well as effective use of natural resources. All of these areas are tackled in EU Strategy 2020 criteria and their fulfillments are subject to uncertainty in the current crisis.

The EU 2020 Strategy as a successor of the Lisbon Strategy states that the exit from the crisis should be the point of entry into a new and sustainable social market economy, a smarter, greener economy, where our prosperity will come from innovation and from using resources better, and where the key input will be knowledge.

The establishment of this kind of knowledge society will need a radical rethinking on the part of European policy-makers when dealing with educational matters. The EU 2020 Agenda has taken an important step forward by setting the target for tertiary graduation rates at an ambitious 40%.

However, many European countries, very likely will not be able to meet this benchmark in 2020, especially those concerning poverty reduction and investing in research and development as the most crucial factor for the future sustainable growth in the EU as a whole. While some of the EU countries are already achieved required criteria indicated from the EU 2020 strategy , there are also many which are not even close to the required targets with no prospects to achieve them till 2020.

There are also clear signs of increases in the number of people at risk of income poverty, notably child poverty, and social exclusion, which require increase of the amounts for social transfers and decrease the opportunity for increase the budgets for research and innovations .

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ZHVILLIMI DHE KRIJIMI I BAZËS SË TË DHËNAVE HISTORIKE PËR MINIERËN E SKROSKËS NË MICROMINE

(The Creation and Developement of the Historical Database for Skroska Mine with Micromine)

Arbi SHEHU[1] and **Skënder LIPO**[2]

ABSTRAKT

Sfida e shkencës minerare në vitet e fundit është menaxhimi sa më i mirë i rezervave minerare të dhëna në një vendburim në të tre fazat, vlerësimin e rezervave të një vendburimi, përgatitjen e minierës për nxjerrjen sa më të plotë të rezervave të dhënave, dhe përpunimin teknologjik të mineralit të nxjerrë, si një aset i papërsëritshëm, për realizimin e një aktiviteti minerar të suksesshëm. Kërkesat për modelimin sa më të plotë të trupave xeherorë, duke krijuar një material të saktë përshkrimor dhe grafik, kanë sjellë përgatitjen dhe përdorimin me sukses të shumë programeve kompjuterike në praktiken e sotme minerare.
Në materialin e paraqitur jemi përpjekur të sjellim një kontribut modest në fushën e përdorimit të programit Micromine për ndërtimin e bazës së të dhënave historike të hekur nikelit në vendburimin e Skroskës, për përdorim në një fazë të dytë për vlerësimin e gjithë proceseve minerare që zhvillohen në këtë miniere.

Fjalë Kyçe: Micromine, GIS, Modelim Minerar, Baze të Dhënash Minerare.

ABSTRACT

The challenge of the exploration science in the recent years is the optimal management of the mineral reserves of the source in three stages, the estimation of reserves of a deposit, the preparation of the mine to extract as much mineral as possible and the technological processing of the extracted mineral, as a unique asset for the realization of a successful mining activity. Requests for a complete modeling

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of the ore bodies, creating a precise content of description and graphics, have brought successful preparation and use of many software in today's practice of mining.

The paper at hand represents a modest contribution in the field of use of the program Micromine for building a historic database for the iron-nickel source of Skroskës, for use in a second phase to evaluate all mining processes that take place in this mine.

Key words: Micromine, GIS, Mine Modeling, Mining Databaze.

1. MINIERA E FE/NI SKROSKËS

Miniera e Skroskës është pjesë e Vendburimit të Hekur-Nikel në zonën Bushtricë – Skroskë. Ky vendburim i përket grupit të vendburimeve të Pishkashit, të cilët shtrihen në rrethin e Librazhdit. Miniera e hekur-nikelit Skroskë ndodhet midis minierës së Bushtricës dhe asaj të Përrenjasit. Miniera ka një shtrirje prej 2.5 km dhe një rënie prej 4km, me një sipërfaqe totale prej 10km^2 (Shoqëria Gerold ShPK, 2013).

Kjo minierë është e pozicionuar në afërsi të fshatit Pishkash të Komunës Qukës, Rrethi Librazhd. Ajo ndodhet në një largësi rreth 8 Km prej rrugës nacionale Elbasan – Korçë, e cila shtrihet në perëndim ndërsa paralel me të kalon linja hekurudhore Librazhd-Guri i Kuq (Map 1).

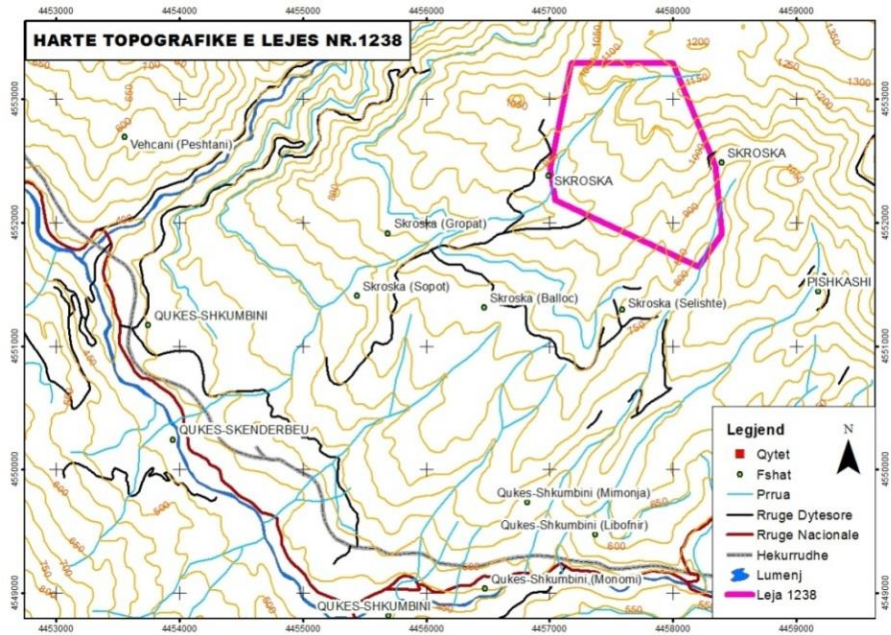
Miniera e Skroskës ka filluar aktivitetin e saj prodhues në vitin 1985 deri në qershor të vitit 1992. Në këtë vit miniera kaloj në konservim. Përgjatë kësaj periudhe janë hapur mbi 15 km punime kapitale dhe janë nxjerrë prej saj mbi 1 milion ton mineral Hekur/Nikel. Pjesa më e madhe e këtij minerali ka qenë i destinuar për Kombinatin Metalurgjik të Elbasanit, ndërsa një pjesë e vogël shkonte për eksport (Meksi P. & Aliaj Xh., Et al, 1993). Në bazë të llogaritjeve rezervat e nxjerrshme sipas horizonteve rezultojnë si më poshtë (Tabela 1):

Fillimi	Mbarimi	Sasia (Ton)
+802	+965	2,420,405.0
+685	+802	3,022,780.0
+410	+685	7,099,940.0
Total të Nxjerrshme (+410 - +965)		**12,543,125.0**
Te supozuara (+410)		**709,780.0**

Tabela 1 Gjendja e Rezervave të Nxjerrshme Sipas Horizonteve (*Raporti Vjetor i ShoqërisëGerold ShPK, 2014*)

Prej vitit 2005, Miniera e Skroskës, zotërohet nga një shoqëri private, e cila kryen aktivitetin e saj në shfrytëzimin e kësaj miniere dhe tregtimin e mineralit të hekuri/nikelit në tregun shqiptar dhe ndërkombëtar. Miniera në fillim të viteve 2007 e deri në vitin 2013, ka qenë në gjendje aktive dhe prodhuese, duke e eksportuar prodhimin në vendet e perëndimit (Shoqëria Gerold ShPK, 2013).

Gjatë vitit 2013, duke qenë se miniera ishte në kushte funksionale si dhe për shkak të kërkesave studimore nga ana e Fakultetit të Gjeologjisë dhe Minierave, u pa e arsyeshme përpunimi i të dhënave në format dixhital të kësaj miniere. Kësisoj, nëpërmjet një bashkëpunimi të shoqërisë private që disponon minierën me Fakultetin e Gjeologjisë dhe Minierave, u bë i mundur fillimi i punës për përpunimin dhe inventarizimin e të dhënave. Ky proces do të pasonte më tej me krijimin dhe zhvillimin e bazës së të dhënave minerare historike, duke i hapur rrugë në këtë mënyrë modelimit minerar nëpërmjet programit Micromine. Nëpërmjet këtij studimi, është përpjekur që të hidhen hapat fillestar për vlerësimin e rezervave gjeologjike sipas kushteve dhe standardeve bashkëkohore.



MAP 1 Hartë Topografike e Zonës së Lejes Minerare 1238 *(Zhvillimi dhe Përdorimi i Sistemeve të Informacionit Gjeografik – GIS në Miniera, Mikrotezë, Shehu. A., 2014)*

2. KRIJIMI I BAZËS DIXHITALE TË TË DHËNAVE

Miniera e Fe-Ni Skroskë, është hapur në vitin 1985, mbi bazën e studimeve gjeologjike të kërkim zbulimit. Nëpërmjet këtij studimi janë kryer 83 shpime sipas prerjeve tërthore si dhe janë ndërtuar hartat plan për zonën e vendburimit. Tërësia e këtyre materialeve hartografike është marrë dhe konvertuar për të krijuar bazën dixhitale të të dhënave të minierës.
Gjendja ekzistuese e materialeve hartografike të minierës përfshin 21 profile tërthore dhe gjatësore, si dhe disa harta plane, për vendosjen e makinerive, ajrimit, etj.
Profilet tërthore të ndërtuara për hapjen e minierës së Skroskës, janë të renditura nga numri I deri në numrin XXX, por prej tyre vetëm profilet XVI – XVIII – XX – XXII – XXIV – XXVI – XXVIII – XXX, janë pjesë e konturit të lejes minerare të disponuara nga shoqëria shfrytëzuese (Meksi P. & Aliaj Xh., Et al.,1993), (Figura 1).

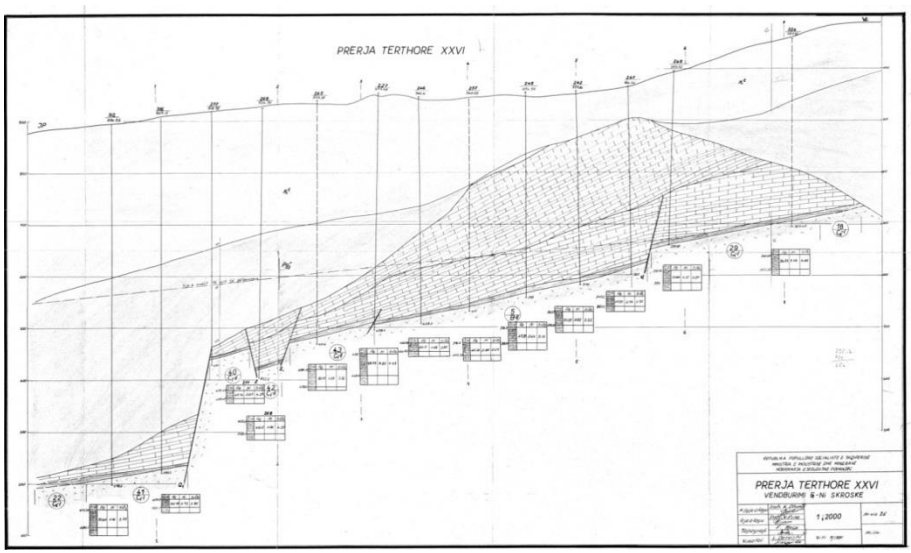


Figura 1 Prerja Tërthore XXVI (*Projekt Ide e Minierës Hekur Nikelit Skroskë, Aliaj Xh. Et al., 1983*)

Ndërtimi i bazës së të dhënave minerare është ideuar rreth këtyre profileve tërthorë dhe gjatësorë, të cilët përmbajnë informacionin kryesor për pozicionin e shpimeve gjeologjike, trashësinë dhe interpretimin e trupave gjeologjik si dhe analizat e mineralit të kapur nga shpimet në thellësi.
Këto profile bashkë me planvendosjet e galerive janë dixhitalizuar, gjeoreferencuar dhe evidentuar në mënyrë që të krijohet mundësia e përdorimit të tyre në programin kompjuterik Micromine (Shehu A., 2014).

3. METODOLOGJIA E ZHVILLIMIT TËBAZËS SË TË DHËNAVE NË MICROMINE

Programi Micromine, është zhvilluar fillimisht në vitin 1987, si pjesë e një paketë programesh për fushën e zbulimit në gjeologji. Ky program rezulton si një nga programet e para të llojit të tij i cili përdorej në një kompjuter personal. Nëpërmjet tij, për herë të parë gjeologët patën mundësinë të analizonin të dhënat e mbledhura në terren nëpërmjet një kompjuteri personal (Micromine Overview, 2007).
Micromine, funksionon nëpërmjet një tërësie modulesh, të cilat japin mundësi përdoruesve në bazë të nevojave specifike që ata kanë. Modulet fillestare të këtij aplikacioni janë Baza, Eksplorimi, Modelimi, Vlerësimi Rezervave, Matjet, Minierat dhe Kontrolli i Gradës, Optimizimi i Karrierës dhe Skedulimi (Figura 2).

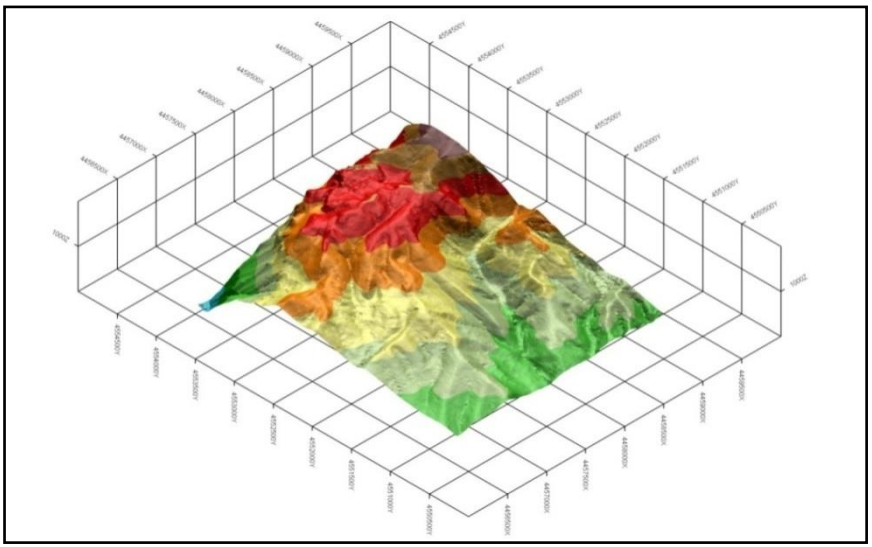


Figura 2 Modelimi 3D i terrenit të minierës Skroskë në Micromine*(Zhvillimi dhe Përdorimi i Sistemeve të Informacionit Gjeografik – GIS në Miniera, Mikrotezë, Shehu. A., 2014)*

Programi Micromine, në krijimin dhe zhvillimin e bazës së të dhënave historike minerare për Minierën e Skroskës është përdorur për disa procese të një pas njëshme të cilat përfshijnë:

3.1 Gjeoreferencimi i profileve gjatësorë dhe tërthorë

Gjeoreferencimi 3D realizohet në programin Micromine nëpërmjet menusë Georeference Image. Në këtë menu përcaktohet specifikisht vendndodhja

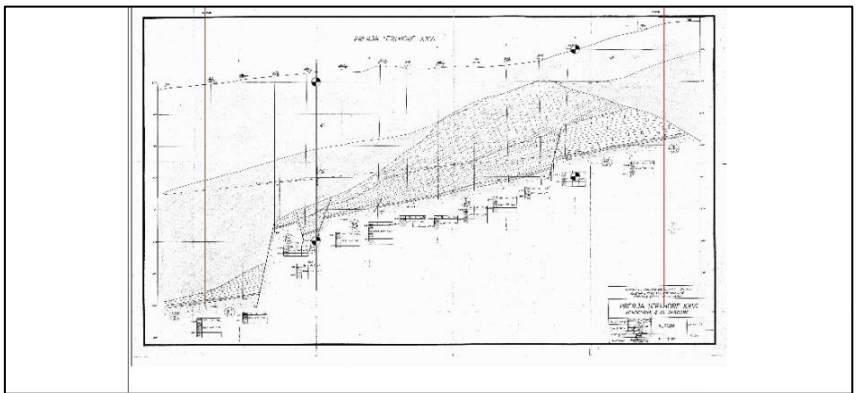
grafike e pikës dhe koordinatat e saj X,Y,Z. Minimumi i pikave të kërkuara janë tre, për të arritur një saktësi të lartë preferohen të përcaktohen katër deri në tetë pika.

Pasi të jenë përcaktuar pikat dhe vendosur koordinatat për tri pikat e para, do të afishohet saktësia e imazhit dhe gabimet e gjeoreferencimit. Në këtë moment është i mundur përcaktimi i pikës së katër në mënyrë për të ulur gabimin e mundshëm të gjeoreferencimit (Shehu A., 2014).

Për të vërtetuar saktësinë e gjeoreferencimit të kryer do të shikohet koeficienti i gabimit për gjeoreferencimin e imazhit. Ky gabim është i specifikuar me emërtimin (*RSM Error*), në mënyrë që gabimi të jetë i vogël numri i paraqitur duhet të jetë kryesisht më i vogël se vlera 1. Në këtë mënyrë sa më i afërt me 0 të jetë vlera aq më i saktë do të jetë dhe procesi i gjeoreferencimit.

Në rast të evidentimit të një vlere më të lartë se 1, atëherë duhet ndjekur procedura e kontrollit të pikave të vendosura, duke parë fillimisht raportin koordinat/pozicionim. Në qoftë se këto pika rezultojnë të sakta atëherë do të veprohet me shtimin e pikave në mënyrë eksponenciale, duke gjeoreferncuar imazhin me tetë pika.

Gabimi i gjeneruar nga gjeoreferencimi i profileve tërthorë dhe gjatësorë për minierën e Skroskës është i rendit nga 0.1 - 0.5, duke iu përmbajtur kushtit të gabimit maksimal me vlerë më të vogel se 1. Për shumicës e profileve janë përdorur katër pika gjeoreferencimi, por në disa raste specifike ku gabimi shkonte më i madh se 1, atëherë janë përdorur tetë pika gjeoreferencimi (Muka G. & Korini Th., 2010), (Figura 3).



Point ID	Image X (pixels)	Image Y (pixels)	RMS error (pixels)	Coordinate X	Coordinate Y	Coordinate Z	RMS error (coordinates)	On/Off
1	1695.41	889.58	2797273.810	4457537.630	4551803.430	900.000	0.109	☑
2	1695.12	2365.33	2798749.560	4457537.630	4551803.430	400.000	0.109	☑
3	4030.27	589.97	2793706.123	4457968.050	4552474.480	1000.000	0.136	☑
4	4030.48	1767.97	2794884.123	4457968.050	4552474.480	600.000	0.136	☑

Figura 3 Gjeoreferencimi i Prerjes Tërthore XXVI në Micromine *(Zhvillimi dhe Përdorimi i Sistemeve të Informacionit Gjeografik – GIS në Miniera, Mikrotezë, Shehu. A., 2014)*

3.2 Ndërtimi i bazës së të dhënave të shpimeve

Ndërtimi i bazës së të dhënave të shpimeve të kryera u konceptua që të përshtatej sipas kërkesave specifike që kërkonte programi Micromine në të cilin do të përdorej më pas kjo bazës të dhënash. Për të krijuar bazën e të dhënave janë përdorur të dhënat e marra nga profilet tërthore dhe harta e shpimeve. Në këtë mënyrë u krijuan një model bazë të dhënash nëpërmjet programit Microsoft Exel, duke i korresponduar fushave të mëposhtme (Tabela 2):

Baza e të Dhënave të Pozicionit të Shpimeve	**Baza e të Dhënave të Cilësisë së Mineralit**
Numri i Shpimit	Numri i Shpimit
Numri i Profilit	Numri i Profilit
Gjatësia	Fillim
Azimuti	Mbarim
Këndi	Intervali
Koordinatat X Y Z	Minerali
Statusi	%Fe
-	%Ni
-	SiO_2

Tabela 2 Struktura e bazës së të dhënave të shpimeve *(Zhvillimi dhe Përdorimi i Sistemeve të Informacionit Gjeografik – GIS në Miniera, Mikrotezë, Shehu. A., 2014)*

Gjithashtu përkrah ndërtimit të bazës së të dhënave të shpimeve në programin Microsoft Exel, u ndërtua edhe baza e të dhënave e intervaleve të kapjes dhe cilësisë. Nëpërmjet kësaj baze të dhënash, për çdo shpim evidentohet intervali i kapjes së mineralit të Fe-Ni dhe cilësisë së tij sipas analizave të kryera në kohën e kryerjes së shpimit. Këto të dhëna janë të pasqyruara në pjesën e poshtme të shpimeve në profilet tërthore dhe gjatësore të vendburimit (Shehu A., 2014).

Ndërtimi i kësaj baze të dhënash i hap rrugë pasqyrimit të shpimeve në 3D ku në përputhje me relievin e zonës do të paraqiten të dhënat e mineralit të kapura nga shpimet (Figura 4).

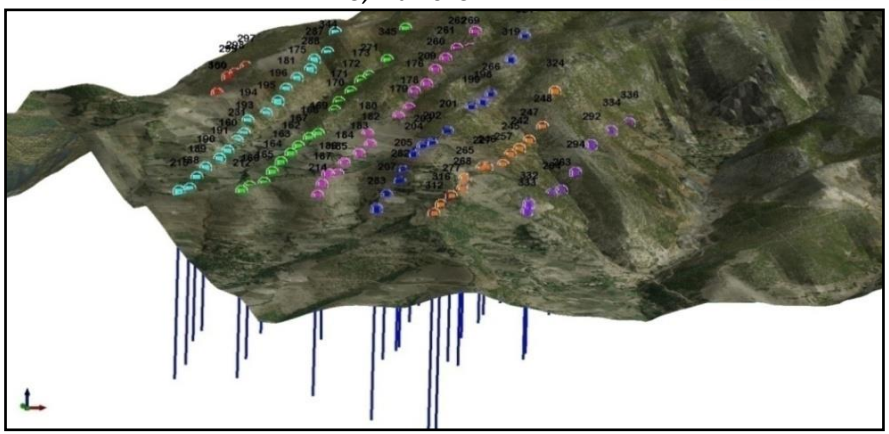


Figura 4 Paraqitja në Micromine e Shpimeve historike dhe terrenit 3D*(Zhvillimi dhe Përdorimi i Sistemeve të Informacionit Gjeografik – GIS në Miniera, Mikrotezë, Shehu. A., 2014)*

3.3 Ndërtimi i modelit 3D të galerive të minierës

Rrjeti i punimeve të hapura në minierën e Skroskës është i fokusuar në tre horizonte kryesore, dy nivele të ndërmjetëm dhe tre dishenderi. Këto punime janë kryer përgjatë periudhës 1987-1991,periudhë kur u mbyll edhe miniera.
Për secilën prej këtyre punimeve janë mbajtur të dhëna tabulare për pikat e drejtimit të tyre si dhe janë krijuar hartat e minierës dhe po ashtu ato janë pasqyruar në prerje tërthore (Kuka R. & Ceka A., 1986). Këto pika mbështetëse janë marrë dhe përpunuar në programin Microsoft Exel duke u krahasuar me hartat dhe prerjet tërthore të skanuara duke krijuar kështu një skedar për secilin bllok punimesh. Të dhënat e krijuara në Microsoft Exel kanë shërbyer si bazë e të dhënave për pikat mbështetëse të galerive, të cilat janë të specifikuara koordinatat X-Y-Z dhe numri lidhës i pikës.
Këto të dhëna janë krijuar në mënyrë të mëvetshme për të gjitha punimet kapitale të minierës së Skroskës. Të dhënat e krijuara në mënyrë të veçantë për secilin front punimi janë përdorur dhe futur në programin Micromine për të krijuar modelimin e punimeve minerare të minierës së Skroskës. Ky proces do të kryhet nëpërmjet metodës Wireframe/Center Line to Solid, duke krijuar në këtë mënyre formën 3D të galerive të hapura në minierën e Skroskës (Figura 5).

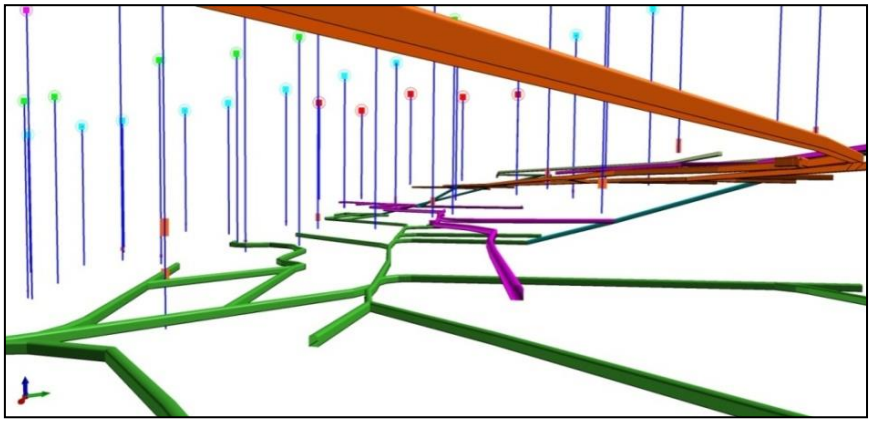


Figura 5 Paraqitja 3D në Micromine e Galerive dhe Shpimeve*(Zhvillimi dhe Përdorimi i Sistemeve të Informacionit Gjeografik – GIS në Miniera, Mikrotezë, Shehu. A., 2014)*

PËRFUNDIME

Në përfundim të këtij studimi janë realizuar në mënyrë konkrete tri hapa thelbësore. a) Gjeoreferencimi i profileve dhe dixhitalizimi i profileve, b) Krijimi i bazës së të dhënave për minierën, ku përfshihen, baza e të dhënave të Shpimeve, baza e të dhënave të Cilësisë së Mineralit c) Krijimi i të dhënave në Micromine-3D ku përfshihen, Krijimi i Shpimeve, Krijimi i Terrenit (DTM), Krijimi i Punimeve Kapitale të Galerive (Shehu A., 2014).

Ky punim sjell risinë e përdorimit të programit Micromine dhe metodologjisë së inventarizimit të të dhënave minerare sipas metodave bashkëkohore. Duke iu referuar rastit të Minierës Skroskës mund të arrijmë në përfundimin se dokumentacioni gjeologjik dhe markshajderik i mbajtur në minierën e hekur nikelit Skroskë është ruajtur mirë dhe na krijoi mundësinë për një vlerësim paraprak të gjithë aktivitetit të kësaj miniere, për më shumë se 30 vite.

Gjithsesi fakti se të dhënat e përdorura i përkasin një periudhe më shumë së 30 vjeçare, sjell problemin e çertifikimit të tyre. Kjo problematikë mbetet kryesore duke qenë se këto të dhëna janë thjesht tabulare dhe grafike, ku për to nuk ekzistojnë interpretime nga autorët. Interpretimet e inxhinjereve që i kanë krijuar të dhënat do të ndihmonin për analizimin sa më të saktë të vendburimin dhe krijimin e fazave të mëtejshme të këtij punimi. Duke marrë shkas nga kjo situatë, në vazhdimësi do të merret parasysh edhe një përqindje gabimi përsa i përket të dhënave të përdorura.

Problematika e mësipërme vërehet kryesisht në përputhjen e të dhënave të shpimeve të marra nga tabelat, me të dhënat e shpimeve të marra nga

gjeoreferencimi i profileve gjatësorë ose tërthorë. Në këtë rast specifik, gabimi i matur është një zhvendosje prej 0.5-1m.

Realizimi i këtij punimi i hap rrugën mundësisë së zgjerimit të mëtejshëm të studimit të minierës së Fe/Ni Skroskë. Duke përdorur këto të dhëna historike dhe mundësitë e ofruara nga programi kompjuterik Micromine, minierës i jepet mundësia e zhvillimit të modelit minerar të trupave gjeologjike dhe të shfrytëzuar, llogaritjes së rezervave por edhe të mundësisë së planifikimit të mëtejshëm të shfrytëzimit të minierës (Shehu A., 2014).

Përsa i përket vazhdimit të punës, është e këshillueshme që studimi të kontrollohet edhe nga inxhinier gjeolog me njohuri në vendburimet e Fe/Ni, të cilët mund të rekomandojnë më tej për proceset e llogaritjes së rezervave duke analizuar të dhënat historike të krijuara dhe ecurinë e minierës përgjatë këtyre viteve që është shfrytëzuar.

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MBI ZHVILLIMET TEORIKE NË PROCESIN E PËRGJITHËSIMIT HARTOGRAFIK

(On the theoretical developments in the process of cartographic generalization)

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ABSTRACT

Cartographic generalization is one of the most unpleasant problems in cartography. Traditionally, in this process has dominated the manual method conducted individually and subjectively. Because of the subjective nature of cartographic generalization and lack of well-defined rules to guide the decision making, automatization of this process is very difficult.
However, in recent decades, researchers have made great efforts and achieved much success in technology of digital generalization. The main attention in this process has been the formalization of digital generalization theory and its practice in reality. In GIS environment there are different tools for data generalization.
In this paper is treated, briefly, the state of cartographic generalization in order to understand the needs and plans for the implementation of digital generalization capabilities in Albanian institutions and companies of GIS and Cartography. The article emphasizes the importance of integrating of cartographic knowledge with generalization systems.

Key words: cartographic generalization, digital generalization, generalization operators, GIS, generalization tools, expert systems.

PËRMBLEDHJE

Përgjithësimi hartografik është një prej problemeve më të papëlqyeshme në hartografi. Tradicionalisht, në këtë proces ka mbizotëruar metoda manuale e

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realizuar individualisht dhe në mënyrë subjektive. Për shkak të natyrës subjektive të përgjithësimit hartografik dhe mungesës së rregullave të përcaktuara mirë për të udhëzuar vendimmarrjen, automatizimi i plotë i këtij procesi është shumë i vështirë.
Megjithatë, në dekadat e fundit janë bërë përpjekje të mëdha dhe janë arritur mjaft suksese në teknologjinë e përgjithësimit dixhital. Fokusi kryesor në këtë proces ka qenë dhe është formalizimi i përgjithësimit digjital në teori dhe praktikimi i tij në realitet. Në varësi të faktit nëse do të përgjithësohen të dhëna vektor ose raster, ekzistojnë mjete të ndryshme për përgjithësimin e të dhënave GIS duke përdorur ArcGIS.
Ky artikull ka për qëllim të shqyrtojë, shkurtimisht, gjendjen e teknologjisë së re të përgjithësimit hartografik dhe të ndihmojë për të kuptuar nevojat dhe planet për zbatimin e aftësive të përgjithsimit dixhital në institucionet dhe kompanitë shqiptare të GIS dhe të Hartografisë. Artikulli vë theksin në rëndësinë e integrimit të njohurive hartografike me sistemet e përgjithësimit.

Fjalë kyç: Përgjithësim hartografik, përgjithësimi dixhital, operatorët e përgjithësimit, GIS, Mjetet e përgjithësimit, Sistemet ekspert.

1. HYRJE

Procesi i përgjithësimit[4] është një mjet i fuqishëm dhe absolutisht i nevojshëm për të dhënat hapësinore që përdoren në ditët e sotme në hartografi dhe në Sistemet e Informacionit Gjeografik (GIS).
Teoria e përgjithësimit/gjeneralisimit hartografik është e lidhur ngushtë me teorinë e përgjithshme të hartografisë sepse ka të bëjë me procese dhe etapa të rëndësishme për krijimin e hartave siç janë: analiza, përzgjedhja, thjeshtimi, harmonizimi dhe qartësimi, në përshtatje të plotë me shkallën, paracaktimin, tematikën dhe veçoritë gjeografike të territorit në studim. Në këtë kontekst, përgjithësimi hartografik[5] e ngushton përfytyrimin e botës reale, por deri në atë masë që përmbajtja e hartave të përvetësohet maksimalisht nga lexuesi e përdoruesi i hartës.
Përgjithësimi hartografik si proces, realizohet kur krijohet një hartë e re në bazë të një harte ekzistuese me shkallë më të madhe, fotografive ajrore dhe imazheve satelitore, matjeve ose rilevimeve fushore, punimeve në zyrë, etj.,

[4] Shoqata Ndërkombëtare e Hartografisë e përcakton "përgjithësimin hartografik" si "përzgjedhjen dhe përfaqësimin e thjeshtuar të detajeve në përshtatje me shkallën dhe / ose qëllimin e një harte" (ICA 1967).
[5] Përgjithësim hartografik emërtohet procesi që thjeshton paraqitjen/përfaqësimin e të dhënave gjeografike në një hartë me një shkallë të caktuar dhe me një legjendë të përcaktuar e të lexueshme. Ky proces përdoret si në hartografinë manuale ashtu dhe në atë digjitale.

ose kur një pjesë e përmbajtjes së hartës së re duhet të merret nga hartat burimore (bazë, plotësuese, ndihmëse). Gjatë këtij procesi, zgjidhet një numër i caktuar i të dhënave, të cilat kanë rëndësi të veçantë dhe mund të paraqiten qartë në hartën e re.

Në efektivitetin e përgjithësimit hartografik gjatë procesit të krijimit të hartës, ndikojnë: përgjithësimi i objekteve në natyrë, i cili realizohet zakonisht me anën e metodave klasike (rilevim me menzol, takiometri etj) si dhe me anën e metodave bashkëkohore si GPS etj,; përgjithësimi optik i cili lidhet me aftësinë e lejuar (AL)/rezolucionin (R) e fotografive ajrore apo imazheve satelitore dhe përgjithësimi fiziologjik i cili ka të bëjë me aftësinë e syrit të njeriut për të dalluar objektet e dukuritë (që paraqiten në fotografi apo imazh) dhe që kanë përmasa tepër të vogla.

Përgjithësimi hartografik, mund të jetë gjeometrik[6], ku gjeneralizohet forma hapësinore e objekteve dhe dukurive gjeografike ose konceptual[7], ku bëhet përgjithësimi kuptimor/në përmbajtje i objekteve dhe dukurive gjeografike. Ky përgjithësim kushtëzohet nga një numër i madh faktorësh[8], marrja parasysh e të cilëve ka çuar në përpunimin e shumë modeleve matematikore. Por, përgjithësimi hartografik në një masë të caktuar paraqet një punë subjektive, e cila del në pah veçanërisht tek hartat tematike.

Kompjuterizimi ka çuar në nevojën për zgjidhje algorithmike në proceset e përgjithësimit hartografik. Përgjithësimi dixhital ka të bëjë, në fakt, me kërkimin e teknikave të kompjuterizuara për të bërë diçka që nuk është ekzekutuar në mënyrë të vazhdueshme, ose nuk është trajtuar teorikisht para ardhjes së GIS.

2. NDRYSHIMET NË PËRGJITHËSIMIN HARTOGRAFIK.

Pavarësisht nga lloji i mjedisit të publikimit - letër, ose digjital - përshtatja e përmbajtjes së një harte është shumë e varur nga shkalla. Është e qartë se një

[6] Përgjithësimi gjeometrik ndahet në grafik (përgjithësim i cili bëhet me dorë) dhe numerik (ai që kryhet me ndihmën e modeleve matematikore dhe softuerëve kompjuterikë). Përgjithësimi gjeometrik në një masë të madhe përdoret tek hartat gjeodezike, topografike dhe hartat e përgjithshme gjeografike

[7] Gjatë përgjithësimit konceptual, janë të pranishëm në masë të madhe përgjithësimi sasior dhe ai cilësor. Në këtë rast objektet dhe dukuritë përgjithësohen sipas vendimeve subjektive të vetë autorit të hartës. Përgjithësimi konceptual/kuptimor kryesisht përdoret te hartat tematike

[8] Në përgjithësimin hartografik ndikojnë: shkalla e hartës, paracaktimi i saj, rëndësia e objekteve, madhësitë minimale, d.m.th. përmasat minimale të elementeve grafike që mund të identifikohen nga syri i njeriut, veçoritë e territorit që hartografohet, burimet hartografike, kufiri i lexueshmërisë dhe ngarkesa grafike.

hartë në shkallë të vogël përmban informacion më pak të detajuar se një hartë në shkallë të madhe të të njëjtës zonë. Jo vetëm shkalla, por edhe tema e hartës përcakton dendësinë e të dhënave të përfaqësuara. Procesi i zvogëlimit të sasisë së të dhënave dhe i përshtatjes së informacionit në shkallën dhe temën e caktuar, quhet përgjithësim kartografik (Müller (1991),Weibel and Dutton (1999)). Kjo procedurë përmbledh dhe zvogëlon informacionin nga realiteti, ndërkohë ruan specifikimet hartografike, dhe karakteristikat e rëndësishme të zonës së hartografuar. Shihet lehtë se ky proces është shumë i ndërlikuar dhe kërkon kohë. Kryesisht me përhapjen e mediave të reja (të tilla si multimedia, internet, etj), shpejtësia e procesit të ofrimit të informacionit është bërë gjithnjë e më e rëndësishme. Sot, përgjithësimi është i nevojshëm në kohë reale, pasi përdoruesi nuk pret më shumë se disa sekonda për vizualizimin e një harte të personalizuar në Internet (Feringa 2001). Për shkak të rritjes së vëllimit të informacionit dhe dendësisë që mund të derivohet nga serverat e hartës internet, përgjithësimi hartografik po bëhet gjithnjë e më i rëndësishëm se kurrë dhe duhet të përshtatet me kërkesat e reja në procesin e krijimit të hartës (Kraak and Brown 2001). Përveç kësaj, produktet e ardhshme hartografike duhet të vazhdojnë të jenë më të orientuara drejt shërbimit. Nga njëra anë përdoruesit nuk duhet të përballen shumë me përcaktimin e kërkesave të hollësishme; sistemi, me anë të preferencave të paracaktuara dhe kërkesës që është gjeneruar, duhet të kuptojë se çfarë lloji harte dëshiron të ketë përdoruesi. Nga ana tjetër, për përdoruesit ekspertë, duhet të jetë në dispozicion mundësia për të përcaktuar më shumë kërkesa të sakta (p.sh. shkalla, faqosja, përmbajtja dhe shtrirja hapësinore).

Përgjithësimi hartografik është një prej problemeve më të papëlqyeshme në hartografi. Tradicionalisht në këtë proces ka mbizotëruar metoda manuale e realizuar individualisht dhe në mënyrë subjektive. Teknologjia kompjuterike ka nevojë për kritere të sakta të punës së kualifikuar, punë e cila në të kaluarën bëhej me anën veprimeve të intuitës, vlerësimit dhe arsyes njerëzore.

Në se gjeneralisimi hartografik ndahet në tri komponentë bazë – zgjedhja, gjeneralisimi dhe harmonizimi – atëherë zgjedhja (reduktimi i elementeve) është ajo që pothuajse adaptohet thjeshtë në nevojat/kërkesat e përpunimit kompjuterik të hartës. Këto kritere zbatohen në bazën e të dhënave që përdoret për përpunimin e hartës ose vendosen prej krijuesit të hartës (autor, botues/redaktor) siç janë përdorur në teknologjitë tradicionale të përpunimit të hartës në shekujt e kaluar.

Gjeneralisimi i elementeve vijë (vijat konturore, komunikacionet, kufijtë etj) ka qenë gjithmonë çështje e konstruktorit të hartës me eksperiencë e të kualifikuar që ndiqte kriterin e vendosur të objekteve më të vogla, kurbave më të vogla etj., të elementeve vija. Algoritmi Douglas-Peucker për

thjeshtimin e vijave është publikuar në vitin 1973 dhe mbetet standard i gjeneralizimit. Por, në rastin e gjeneralisimit (konturimit të ri) të sipërfaqeve të vogla, të shpërndara, të tilla si ishujt apo liqenet, kriteri i "sipërfaqes më të vogël" për gjeneralisimin kompjuterik dështon. Shkencëtarët me eksperiencë të gjeoinformacionit janë kthyer në teoritë e ndryshme matematikore, por rezultatet janë pjesore dhe jo bindëse.

Deri tani rezultati më i suksesshëm është arritur në aplikimin e teorisë së pjesëzës (Berlyant, 1993). Pjesëza është termi i përftuar nga copëtimi i botës dhe përdoret në gjeometrinë shumë - përmasore. Përmasimi i objekteve (D) në gjeometrinë Euklidiane është gjithmonë numër i plotë (1D, 2D, 3D), por në përputhje me gjeometrinë pjesëzore e cila është relativisht e re përmasimi i objekteve në natyrë mund të shprehet prej numrave dhjetorë p.sh. përmasimi i vijës së bregut mund të jetë 1.31 D.

Zhvendosja/zëvendësimi është komponenti i gjeneralisimit hartografik që është më i vështiri për t'u përpunuar nga teknologjia kompjuterike. Fig. 1 ilustron një rast jo krejtësisht të rrallë të zhvendosjes së tri elementeve vijë në një vend të kufizuar (prej relievit ose rrethanave të tjera). Pas zvogëlimit të shkallës së hartës (që çon në gjeneralisimin e paevitueshëm të përmbajtjes së hartës) renditja e drejtimit të tri elementeve (p.sh. hekurudhë, rrugë dhe lum) duhet të ruhet dhe boshtet e tyre duhet të zhvendosen prej pozicioneve të tyre teorike siç duhet në përputhje me karakterin e gjeorelievit ose përmbajtjen tjetër fqinje të hartës. Ky operacion, akoma, kryhet në mënyrë manuale (ndërhyrje subjektive individuale në procesin e gjeneralisimit automatik).

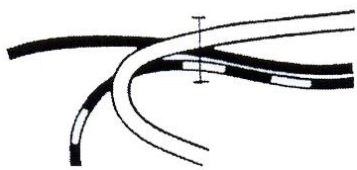


Fig. 1. Zhvendosja e elementeve përmbajtës të hartës

3. PËRGJITHËSIMI DIXHITAL

Përgjithësim digjital, me rrënjë në hartografinë konvencionale, është bërë një shqetësim në rritje në Sistemet e Informacionit Gjeografik (GIS) dhe në fushat hartografike. Edhe pse parimet dhe udhëzimet e përgjithësimit mund të gjenden në literaturën hartografike dhe në organizatat hartografike, akoma nuk ka një sërë rregullash universale që përcaktojnë në mënyrë të qartë se si duhet të kryhet përgjithësimi.

Përgjithësimi manual varet nga përvoja dhe gjykimi i operatorit dhe për këtë arsye prodhohen rezultate kontradiktore. Mungesa e kuptimit plotësisht të procesit dhe mungesa e mjeteve teknike që imitojnë analizën e njeriut, vendimmarrjen dhe veprimet, e bëjnë automatizimin e përgjithësimit një detyrë të vështirë. Megjithatë, evolucioni i zhvillimit të teknologjisë së përgjithësimit dixhital ka shkuar nëpër dekada të tëra. Përpjekjet e mëdha dhe arritjet në këtë fushë përmblidhin më poshtë:

- Në vitet 1960 dhe 1970, disa kërkime të izoluara janë përpjekur të zhvillojnë teknika të thjeshta që reduktojnë kompleksitetin e të dhënave. Shembuj të disa algoritmeve të pakët të përmendura janë algoritmat Douglas Peucker (Douglas dhe Peucker, 1973) dhe Lang (Lang, 1969) të thjeshtimit të vijës dhe algoritmat e Brophy (Brophy, 1972) dhe Chaiken (Chaiken, 1974) të rutinës së lëmimit të vijës.
- Vlerësimet e algoritmeve ekzistuese janë kryer që nga fillimi i viteve 1980 (McMaster, 1988, Visvalingam dhe Whyatt, 1990, Beard, 1991). Teknika më të plota për përgjithësimin e automatizuar janë hulumtuar vazhdimisht; modelimi dhe përgjithësimi i bazuar në rregulla u bë një interes në rritje në fund të viteve 1980 (Nickerson dhe Freeman, 1986; McMaster dhe Shea, 1988, dhe kështu me radhë).
- Përparim i dukshëm në përgjithësimin digjital është bërë në mbarë botën, në vitet 1990. U krijuan një numër organizatash ndërkombëtare[9]

[9] Me qëllim të stimulimit dhe formalizimit tw aktiviteteve kërkimore në përgjithësimin dixhital, janë themeluar organizatat dhe grupet punuese tw mëposhtme:

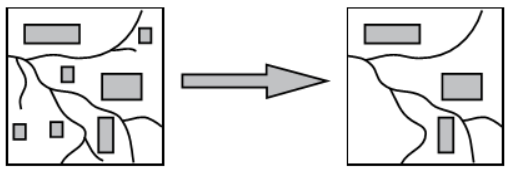
- Grupi punues në përgjithësimin e hartës në kuadrin e Shoqatës Ndërkombëtare të Hartografisw (ICA), si pjesë e Komisionit nw teknologjinw e përparuar, u formua në Konferencën e pesëmbëdhjetë Ndërkombëtare Hartografike (ICC) në Bournemouth, Britania e Madhe, në vitin 1991. Ai ka luajtur një rol të rëndësishëm në ofrimin e një forumi për shkëmbimin e ideve, duke mbështetur një rrjet komunikimi mes njerëzve dhe institucioneve në përgjithësimin e hartës dhe koordinimin e aktiviteteve me grupe të tjera kërkimore.
- Fondacioni Europian i Shkencës ka organizuar një program kërkimor të quajtur GISDATA. Pjesë e aktiviteteve të GISDATA është krijimi i grupeve të ndryshme që janë përgjegjëse për organizimin e takimeve të specializuara për çështje të ndryshme që lidhen me GIS. Një prej kwtyre grupeve merret me temën e përgjithësimit. Një takim specialistwsh wshtw mbajtur në Compiègne, Francë, në dhjetor të vitit 1993. Si rezultat i këtij takimi, wshtw botuar një libër (redaktuar nga Muller, et al., 1995) si një koleksion i artikujve që paraqesin dhe përshkruajnë gjendjen e pwrgjithwsimit tw hartës dixhitale.
- Qendra Kombëtare e Shteteve të Bashkuara për Analizën e Informacionit Gjeografik (NCGIA) mbajti Simpoziumin pwr pwrgjithwsimin e hartës në Universitetin e Sirakuzës, në mes të prillit të vitit 1990, i financuar bashkërisht me

(shih më poshtë) për të koordinuar projektet kërkimore të përgjithësimit dixhital dhe takime të veçanta. Fokusi kryesor është formalizimi i përgjithësimit digjital në teori dhe praktikimi i tij në realitet. Disponueshmëria e sistemeve përgjithësuese më gjithëpërfshirëse i ka dhënë hartografëve mjedise eksperimentale.

3.1. Operatorët e përgjithësimit

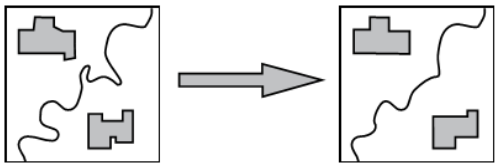
Përgjithësimi përfshin një pjesë të madhe të analizave njerëzore të të dhënave gjeografike dhe vendimeve mbi atë se çfarë të përgjithësojmë, si t'a përgjithësojmë dhe si të zgjidhim konfliktet e simboleve. Është shumë e vështirë të automatizosh plotësisht këtë proces për shkak të natyrës subjektive të tij dhe mungesës së rregullave të përcaktuara mirë për të udhëzuar vendimmarrjen. Alternativë është automatizimi i punës kompjuterike sa më shumë të jetë e mundur dhe lënia e vendimmarrjes në dorë të përdoruesit, që është zgjidhje e ndihmuar nga kompjuteri.
Në mënyrë që të zhvillojmë një zgjidhje me ndihmën e kompjuterit, është e nevojshme të kuptojmë se çfarë ndodh saktësisht kur një hartograf përgjithëson një hartë, dhe të bëjmë veprimet e përcaktuara në mënyrë të qartë për zbatimin dixhital. Një proces i komplikuar përgjithësimi mund të zbërthehet në kategoritë e mëposhtme operacionale, të cilat përshkruhen në terminologjinë e përgjithësimit dixhital:

- Përzgjedhje - Përzgjedhja e klasave të veçorive të caktuara nga një bazë të dhënash për t'i përfshirë në hartën përfundimtare. Përzgjedhja varet në shkalla e hartës dhe qëllimi i saj. Veçoritë e përzgjedhura marrin pjesë në operacionet e mëtejshme të përgjithësimit.
- Eliminimi – eleminimi selektiv i veçorive që janë shumë të vogla, shumë të shkurtëra dhe tepër të parëndësishme për t'u paraqitur në hartën përfundimtare; për shembull, ishuj të vegjël, rrugë të shkurtëra, fshatra të vegjël etj.

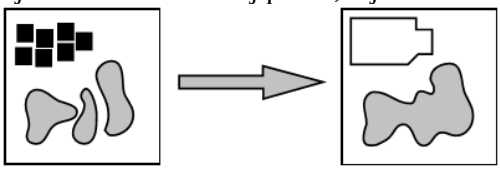


Universitetin e Sirakuzws. Një nga nismat kërkimore tw NCGIA është "formalizimi i njohurive hartografike". Një takim specialistwsh u mbajt në tetor 1993, duke adresuar përgjithësimin dhe çështje të tjera tw hartografisw dixhitale.

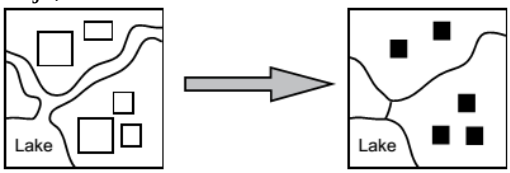
- Thjeshtimi - Heqja e detajeve të panevojshme, të tilla si kthesa pa lidhje dhe luhatjet, nga një linjë apo një kufi zone pa dëmtuar formën e saj thelbësore.



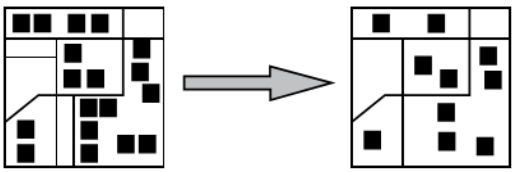
- Grumbullimi – Kombinimi i veçorive në afërsi ose në veçoritë ngjitur në një veçori të re sipërfaqe; për shembull, formimi i një zone të ndërtuar nga një grup ndërtesash apo bashkimi i parcelave e fushave të kulturave bujqësore në një zonë të madhe bujqësore, etj.



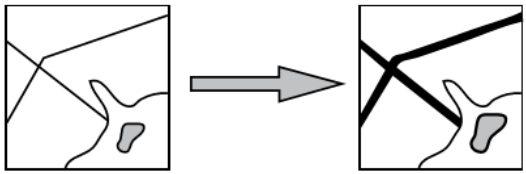
- Dobësim/Collapse - Reduktimi i një dimensioni të veçorisë apo përfaqësimi/paraqitjeje të shtrirjes së saj hapësinore; për shembull, duke ndryshuar një veçori sipërfaqësore në një veçori lineare apo veçori pikësore, duke ndryshuar një veçori shumë-lineare në një veçori të vetme – linjë/vijë, dhe kështu me radhë.



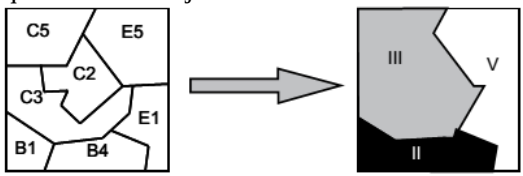
- Tipizimi - Reduktimi i dendësisë së veçorisë dhe nivelit të detajeve duke ruajtur modelin përfaqësues të shpërndarjes dhe përshtypjen vizuale të grupit të veçorisë fillestare/origjinale; për shembull, duke zvogëluar sasinë e detajeve në rrjetin kullues pa humbur përshtypjen e strukturës së tij.



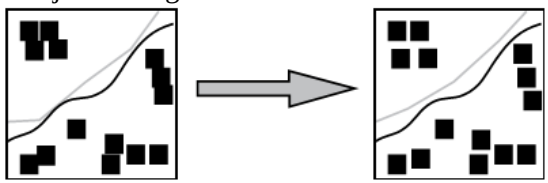
- Ekzagjerim - Rritja e shtrirjes hapësinore të përfaqësimit të veçorisë me qëllim të theksimit dhe lexueshmërisë së saj; për shembull, zgjerimi i madhësisë së një ishulli, i cili meqenëse është mjaft i vogël edhe mund të hiqet, por duhet paraqitur për shkak të rëndësisë së tij si një pikë referimi për navigim.



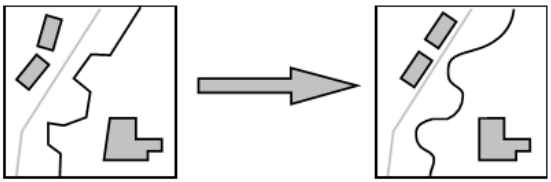
- Klasifikimi dhe simbolizimi - Grupimi i veçorive që ndajnë atribute të ngjashme gjeografike në një të re, klasë veçorie e nivelit më të lartë dhe duke e përfaqësuar atë me një simbol të ri.



- Zgjidhja e konfliktit (Zhvendosja) – Zbulimi i konfliktit të veçorisë dhe pastaj ripozicionimi i veçorisë me konflikt më pak të rëndësishëm ose përshtatja e shtrirjes së veçorisë për të kënaqur pragun e ndarjes dhe specifikimet e tjera hartografike.



- Përpunimi - Ndryshimi dhe përshtatja e gjeometrisë ose pamjes së veçorisë për të përmirësuar përshtypjen estetike (vizuale) të saj dhe për të siguruar marrëveshjen e saj me realitetin. Disa shembuj janë: lëmimi i një linje, kuadratimi i një qosheje, ndryshimi i orientimit dhe bashkëngjitja e një simboli pikë, korrigjimi i këndeve të ndërprerjes së një konturi dhe një lumi, etj.



Bazuar në përcaktimet e mësipërme, është krijuar një grup operatorësh përgjithësimi për të kryer në mënyrë automatike këto operacione dhe për të prodhuar rezultatet e dëshiruara.

4. PËRGJITHËSIMI HARTOGRAFIK NË GIS

Përgjithësimi mund të arrihet duke hequr detaje, duke treguar kështu vetëm p.sh. rrugët kryesore, kufijtë e qarqeve në vend të kufijve të bashkive etj. Në GIS përgjithësimi përdoret edhe për të lëmuar linjat, duke hequr detaje të vogla të tilla si nyjet dhe kthesat e një vijë bregdetare ose meandrimet e një lumi, etj.
Përderisa detajet e një veçorie gjeografike thjeshtohen gjatë përgjithësimit, të dhënat e përgjithësuara janë më pak të sakta nga pikëpamja hapësinore. Llogaritja e gjatësisë, perimetrit, sipërfaqeve etj., e veçorive gjeografike të përgjithësuar shoqërohet me gabime.
Arritja e përgjithësimit të automatizuar përfaqësohet nga njohuritë dhe aftësitë e fituara përmes përgjithësimit manual, dhe rregullat logjike në një mjedis kompjuterik. ArcGIS përmban një sistem universal dhe efikas mjetesh, të cilat janë të grupuara në toolboxes dhe toolsets. Mjetet thirren nga një kuti dialogu dhe nëpërmjet linjave të komandës; ato, gjithashtu, mund të kombinohen me gjuhën e shkruar (p.sh. Python) ose duke përdorur ModelBuilder (një komponent i ArcGIS). ArcGIS përmban një sistem mjetesh per përgjithësimin e rrjetit të të dhënave rastër dhe vektor.
ArcToolbox - korniza e gjeoprocesimit e ArcGIS, është mjedisi ku është ngritur paketa e proceseve për të ekzekutuar dhe manipuluar të dhënat hapësinore. Çdo mjet e gjeoprocesimit merr një rrjedhë të kërkuar të të dhënave (p.sh. një klasë veçorie ose një përzgjedhje të veçorive), së bashku me çfarëdo parametër kontrolli dhe prodhon produkte (të tilla si një klasë të re veçorie). Korniza e gjeoprocesimit/gjeopërpunimit e kombinuar me objektet hartografike të përfaqësimit/paraqitjes, formojnë infrastrukturën e nevojshme për hartografinë e automatizuar shumë produktive (Hardy & Lee, 2005).
Në varësi të faktit nëse do të përgjithësohen të dhëna vektor ose raster, ekzistojnë mjete të ndryshme për përgjithësimin e të dhënave GIS duke përdorur ArcGIS. Ka një grup mjetesh në analistin Toolbox Hapësinor në ArcGIS që lejon përgjithësimin e të dhënave rastër me metoda të ndryshme. Mjetet e përgjithësimit në toolsetet grupohen në tri kategori: Grumbullimi i zonave të të dhënave (Nibble, Shrink, Expand, Region Group, and Thin), lëmimin e nyjeve të të dhënave (Boundary Clean and Majority Filter), dhe

reduktimi i rezolucionit të një rastri (Aggregate). Për të dhënat vektoriale, ArcGIS ka një mjet përgjithësimi në toolset Editing i cili përdor algoritmin e thjeshtësimit Douglas-Peucker për të thjeshtuar linjat (fig. 2). Për metodat shtesë të përgjithësimit, toolseti i përgjithësimit që gjendet në Toolbox Cartography ofron një gamë të mjeteve për thjeshtimin dhe reduktimin e rezolucionit të të dhënave vektoriale për qëllime hartografike.

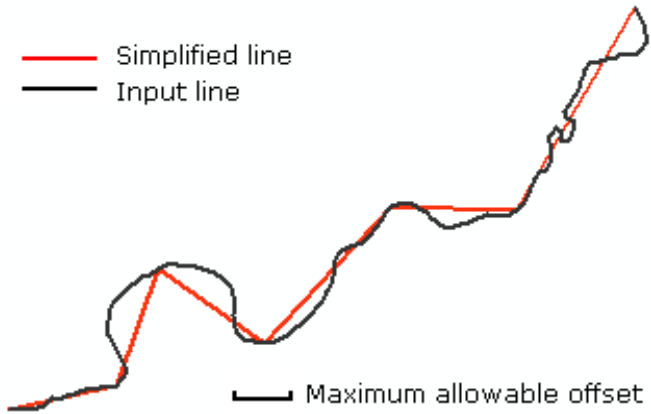


Fig. 2. Lëmimi i një vije/linje duke përdorur mjetin e gjeneralizimit në ArcGIS.

5. SISTEMI EKSPERT DHE PËRGJITHËSIMI HARTOGRAFIK NË GIS

Gjatë dekadave të fundit, janë zhvilluar një numër sistemesh përgjithësimi për qëllime komerciale por akoma nuk është bërë njw vlerësim kritik dhe krahasim i sistemeve të tilla. Kwshtu, akoma nuk është shqyrtuar me themel aplikimi i Sistemeve Ekspert (SE) në sistemet e gjeneralisimit dhe eksperiencën hartografike.

Zhvillimi i SE përfaqëson një aplikim komercial kryesor të Inteligjencës Artificiale (IA) (Boss, 1991). Gjithashtu SE përshkruhet si një sistem softuer ose softuer dhe harduer i kombinuar, i aftë për zbatimin e përshtatshëm të një problemi kompleks të veçantë që interpretohet prej një eksperti por që kërkon ekspertizë shprehëse për zgjidhjen e tij (Bowerman & Clover, 1988) dhe (Karimi & Lodwick, 1987).

SE përshtat një sasi të madhe të interpretimit vlerësues dhe njohurive arsyetuese përmes simulimit të elementit të një njohurie speciale njerëzore (p.sh. hartograf ose interpretues imazhesh) dhe arsyetimit që mund të formulohet brenda pjesëve të njohurisë të klasifikuar prej një bashkësie

faktesh dhe rregullash orientuese. Me fjalë të tjera, SE është një mjet komunikimi ndërmjet njohurive të një përdoruesi me eksperiencë dhe programit kompjuterik për të zgjidhur problemet e vështira/të pavolitshme. SE përpiqet të reduktojë koston dhe kohën, por rrit saktësinë, stabilitetin dhe lidhjen logjike/përputhjen.
SE në softuerë automatike të ndryshme të tilla si ArcGIS, DynaGen dhe LaserScan kanw luajtur një rol të rëndësishëm në përgjithësimin automatik. Një shembull i përdorimit të sistemeve të bazuara në rregulla, në fushën e hartografimit dhe të informatikës, është nxjerrja e tipareve/veçorive prej të dhënave të regjistruara prej së largu (Remote Sensing), zbulimi i rrjeteve rrugore (Wang & Newkirk, 1988), (Domenikiotis, etc., 1995) dhe (Forghani, 2000), ose përgjithësimi i hartës (Armstrong, 1991) dhe (Weibel etc, 1995).
Në realitet, përdorimi i sistemit ekspert është fushë ekzekutimi e AI (Domenikiotis, etc., 1995) dhe (Ball & Moody, 1993). Që në fillimet e 1950-ës, komuniteti i AI është fokusuar në dy fusha kryesore: shkencën njohëse dhe metodat kërkuese (Carrico etc, 1989). Modelimi njohës është interesi i kontekstit përgjithësues të hartës.
Në studimin (Iwaniak etc., 2001), është bërë përpjekje për të kombinuar ekspertizën e njohurive hartografike të specialistit me mjetet softuer të përgjithësuesit të hartës ™ Intergraph MGE me qëllim automatizimin e përgjithësimit të hartave topografike të sipërfaqes urbane prej shkallës 1:10000 në shkallwn 1:50000. Sistemi përdor përgjithësuesin MGE të hartës dhe një rregull të bazuar në sistemin e implementuar në Sistemin Prodhues të Integruar të Gjuhës C (C Language Integrated Production System - CLIPS). Ky sistem është zhvilluar për kontrollin e procesit të përgjithësimit përmes zhvillimit të një njohurie të bazuar në sistemin ekspert që gjeneron rezultate të njëjta me ato të kapura me procedura manuale. Një prej vetive kyçe të këtij sistemi është kapja e zgjidhjes së konfliktit përmes efiçiencës së objekteve. Sistemi ekspert mundëson interpretimin e një trajtimi të ndërmjetëm përmes integrimit të aplikimeve të operacioneve përgjithësuese, rregullave përgjithësuese dhe ndërhyrjes manuale.
Në publikimet më të hershme të autorit (Kazemi etc., 2005), janë testuar operatorët e përgjithësimit në softuer ArcGIS të ESRI-it për të përgjithësuar rrugët duke përftuar GEODATA shumë shkallësh. Pavarësisht nga fakti se rezultatet prej *Douglas-Peucker* and *Bendsimplify* ArcGIS™ janë të kënaqshme, është e qartë se kërkohet puna manuale shprehëse përderisa algoritmet përgjithësuese të ArcGIS-it nuk mbështesin një përgjithësim dinamik. Sistemet e tjera përgjithësuese të tilla si DynaGen™, Integraf dhe Clarity™ Laser-Scan mbështesin përgjithësime të tilla dhe u japin mundësi përdoruesve të përftojnë një bazë të dhënash shumë-shkallësh prej një baze të dhënash udhëzuese.

6. PËRFUNDIME

Teoria e përgjithësimit/gjeneralisimit hartografik është e lidhur ngushtë me teorinë e përgjithshme të hartografisë sepse ka të bëjë me procese dhe etapa të rëndësishme për krijimin e hartave siç janë: analiza, përzgjedhja, thjeshtimi, harmonizimi dhe qartësimi, në përshtatje të plotë me shkallën, paracaktimin, tematikën dhe veçoritë gjeografike të territorit në studim.
Për shkak të rritjes së vëllimit të informacionit dhe dendësisë që mund të derivohet nga serverat e hartës internet, sot përgjithësimi hartografik po bëhet gjithnjë e më i rëndësishëm se kurrë dhe duhet të përshtatet me kërkesat e reja në procesin e krijimit të hartës
Edhe pse parimet dhe udhëzimet e përgjithësimit mund të gjenden në literaturën hartografike dhe në organizatat hartografike, akoma nuk ka një sërë rregullash universale që përcaktojnë në mënyrë të qartë se si duhet të kryhet përgjithësimi.
Mungesa e një kuptimi të plotë të procesit dhe mungesa e mjeteve teknike që imitojnë analizën e njeriut, vendimmarrjen dhe veprimet, e bëjnë automatizimin e përgjithësimit një detyrë të vështirë. Megjithatë, evolucioni i zhvillimit të teknologjisë së përgjithësimit dixhital ka shkuar nëpër dekada të tëra.
Bazuar në parimet e përzgjedhjes, eliminimit, thjeshtimit, grumbullimit, dobësimit, tipizimit, ekzagjerimit, klasifikimit dhe simbolizimit, zgjidhjes së konfliktit (zhvendosjes) dhe përpunimit, është krijuar një grup operatorësh përgjithësimi për të kryer në mënyrë automatike këto operacione dhe për të prodhuar rezultatet e dëshiruara. ArcGIS përmban një sistem universal dhe efikas mjetesh, të cilat janë të grupuara në toolboxes dhe toolsets.
Në kushtet e sotme ka një rëndësi të madhe edhe integrimi i njohurive hartografike me me sistemet e përgjithësimit. Ky integrim lehtëson zhvillimin e një Sistemi Ekspert të fuqishëm dhe fleksibël, të aftë për të gjeneruar (kompozuar dhe korrigjuar) dhe manifestuar (ekspozuar dhe demonstruar) një metodë me vlerë për përgjithësimin gjysmë-automatik të veçorive gjeografike.
Një hap tjetër përpara duhet të jetë edhe zhvillimi i guidës për ta bërë përgjithësimin sa me efiçent të jetë e mundur. Guida duhet të theksojë hapat themelorë dhe të nevojshëm për përgjithësimin e hartave me shkallë të vogël në përputhje me mjedisin paraqitës.

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BOSHTET E ZHVILLIMIT TË TRAFIKUT NË REPUBLIKËN E MAQEDONISË

(Development shafts of the traffic in the Republic of Macedonia)

Zija ZIMERI[1], Florim ASANI[2] and **Arta ZIMERI[3]**

PËRMBLEDHJE

Boshtet e zhvillimit 10 dhe 8 për vitet e nëntëdhjeta (1991), perëndim-lindje, veri-jug për Maqedoninë, pë arsye të embargos së naftës nga ana e Greqisë, hapja e korridorit perëndim-lindje nga Shqipëria dhe Bullgaria për të furnizuar me naftë dhe për nevoja të tjera, sidomos për turizmin transitor është i kushtëzuar nga zhvillimi i boshteve të zhvillimit të trafikut. Kjo mbështetet në njohuritë teorike empirike dhe metodologjike të pozitës gjeografike të Maqedonisë, Moduli i këtij punimi është jo vetëm themelori i sistemit ndërkombëtar të marrëdhënieve në hapësirë, por është një nga faktorët kryesorë që ka ndikuar në zhvillimin e turizmit transitor.

Fjalët kyçe: Boshtet, embargo, moduli, hapësirë, transitor.

SUMMARY

Development shafts 10,8 for the nineties (1991),west-east north-south for Macedonia by the Greece side known with the name oil blockade, the opening of the west-east corridor by Albania and Bulgaria supplied with oil and other needs, especially the transit tourism which is conditioned by the development shafts of the traffic. Based on theoretical empirical and methodological knowledge of geographic position of Macedonia, the Module of this paper is not only the fundamental of the international system of relations in space, but is one of the key factors which have affected the development of transit turism.

Key words: shafts, blockade, module, space, transit.

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HYRJE

Pas pavarësimit të Republikës së Maqedonisë në vitet e nëntëdhjeta (1991), boshti zhvillimor perëndim - lindje u bë i patjetërsueshëm për realitetin maqedonas, për shkak se boshti zhvillimor veri-jug nëpër luginën e lumit Vardar në disa raste nuk funksiononte, sepse nga ana e Republikës së Greqisë qe vendosur bllokadë, sidomos në vitin 1991 kur Maqedonia tërësisht ishte e izoluar nga ana e Greqisë, e njohur me emrin embargo e naftës. Në këtë kohë u intensifikuan qëllimet për intensitetin e hapjes së aksit të zhvillimit perëndim-lindje, për shkak se në këtë kohë si nga ana e Shqipërisë, ashtu edhe nga ana e Bullgarisë vendi ynë furnizohej me naftë dhe me nevoja të tjera.

Përcaktimi metodologjik-teorik i planifikimit hapësinor si proces ka për detyrë për hulumtime më komplekse, më gjithëpërfshirëse dhe më shumështresore, si dhe rishikimin e ndikimit të pozitës gjeografike në organizimin, rregullimin dhe përdorimin e hapësirës. Ajo para se gjithash, rrjedh nga patjetërsueshmëria e lidhjes së të kaluarës me të tanishmen me të gjitha efektet dominante, të cilat shprehen përmes formave të ndryshme të lëvizjes, të ndikimit dhe të marrëdhënieve (Prostroren plan na RM, 2002).

Bazuar në njohuritë teorike, empirike dhe metodologjike të pozitës gjeografike të Republikës së Maqedonisë, gjithsesi se akset zhvillimore (korridori 10, korridori 8 dhe korridori qendror), duhet të vlerësohen nga aspekti i zhvillimit të përgjithshëm të ekonomisë së vendit tonë, si dhe të zhvillimit të të gjitha llojeve të aktiviteteve turistike, posaçërisht të turizmit tranzitor, i cili gjithsesi është i kushtëzuar nga akset zhvillimore trafikore (Ibid). Kjo pozitë nuk është vetëm fundament i sistemit ndërkombëtar të marrëdhënieve dhe relacioneve në hapësirë, por është një ndër faktorët kyç i cili ndikon drejtpërdrejtë apo në mënyrë të tërthortë në formimin dhe funksionimin e sistemit, respektivisht në organizimin dhe funksionimin e hapësirës. Ndikimet e jashtme gjeografike nga rrethi ndërkombëtar i largët dhe më i afërt, duke mos i nënvlerësuar interesat e ndryshme si konflikte gjeostrategjike, ose intencat e fshehura, të cilat në mënyrë interaktive ndikojnë në formimin e strukturave të brendshme hapësinore, përmbajtjeve dhe marrëdhënieve të cilat në aspektin funksional-hapësinor janë me rëndësi shumë të madhe. Duke i konsideruar ndikimet komplekse historiko-zhvillimore të determinuar dhe të kushtëzuara nga rrethanat ndërkombëtare, të cila në masë të madhe ndikojnë në pozitën trafikoro-gjeografike, e përmes saj edhe në marrëdhëniet e tjera (ekonomike, demografike, socioalo-nacionale, civilizuese, ushtarako-politike, gjeostrategjike, etj.), është e patjetërsueshme që të përcaktohen ndikimet relevante, fuqia e tyre dhe

intensiteti. Republika e Maqedonisë bën pjesë në grupin e vendeve më të vogla të Evropës me sipërfaqe të përgjithshme prej 25.713 km^2. Ajo përfshin sipërfaqe me karakteristika të ndryshme fiziko-gjeografike, me resurse dhe potenciale natyrore. Me pozitën e saj qendrore në Ballkan, Republika e Maqedonisë më së tepërmi i afrohet portit të Selanikut, me rreth 80 km nga kufiri jugor dhe rreth 300 km nga kufiri verior. Për këtë shkak Maqedonia është shtet i Evropës Jugore, edhe pse nuk ka dalje direkte në det. Në territorin e Republikës buron dhe nëpër të kalon lumi Vardari, cili me luginën e saj paraqet një potencial integrativ të fuqishëm dhe funksional e hapësinor për lidhjen e tërë Ballkanit. Me ndërlidhjen e luginës së Moravës, korridori i Vardarit shndërrohet në linjë më frekuente e cila duhet të përdoret racionalisht dhe me efikasitet në aspektin funksional dhe hapësinor, para se gjithash për shkak se këtu është formuar sistemi aglomerativ më i madh dhe më i komplikuar në vend (Stojmilov.A., 2001).
Strukturat e vjetra relievore mundësojnë një komunikim të lehtë politik dhe fiziko-gjeografik me regjionet fqinje, kurse në lindje përmes tyre drejt kontinenti aziatik dhe në perëndim drejt Gadishullit Apenin (Stojmilov A., 1985).
Këto konstelacione fizikoro-gjeografike të hapësirës së Republikës sonë shikuar në aspektin historik, kanë mundësuar lidhshmëri kulturore, civilizuese, etnike dhe religjioze të shumë kulturave evropiane, posaçërisht të atyre perëndimore dhe lindore, respektivisht ndikimeve veriore dhe atyre jugore.
Përveç konstatimeve të mëparshme është e patjetërsueshme të potencohet (nga aspekti gjeostrategjik për Maqedoninë) edhe madhësia e territorit, përmbajtjet e hapësirës dhe komponentët e saja cilësore siç janë: relievi, i cili është i llojllojshëm dhe i ndryshëm, mbulesa e volitshme pedologjike, rrjeti hidrografik relativisht i zhvilluar dhe kushtet e ndryshme klimatike, por edhe infrastruktura joadekuate e cila direkt pasqyrohet në sistemin e përdorimit, organizimit dhe rregullimit të hapësirës .
Pozita qendrore e Republikës së Maqedonisë në Gadishullin Ballkanik dhe karakteristikat fizikoro-gjeografike të hapësirës në tërësi mundësojnë një lidhje intensive me vendet fqinje dhe me vendet e regjionit në Evropë si dhe me vendet e detit Mesdhe, respektivisht detit Egje, detit Adriatik, kurse përmes tyre edhe me vendet e Lindjes së Afërt. Boshti natyror Vardar-Moravë me infrastrukturën e ndërtuar me rëndësi evropiane paraqet bosht të rëndësishëm funksional hapësinor për zhvillimin e Republikës. Me intensitetitn e lidhjeve, bazuar në pozitën e volitshme gjeografiko-trafikore të vendeve nga Evropa Qendrore dhe Perëndimore me vendet nga Mesdheu Lindor dhe Lindjes së Afërt, Maqedonia ka mundësi racionale dhe efikase që ta përdorë pozitën e saj hapësinore e funksionale.

Pengesa proporcionale me korridorin e Vardarit, i cili pa mëdyshje ka rëndësi konvergjente, ekzistojnë kushte për aktivizimin e lidhjeve përmes luginës së lumit Kriva Reka dhe qafës Deve Bair me luginën e lumit Strumica me Republikën e Bullgarisë dhe të Lindjes së Afërt, nëpër luginën e lumit Radika dhe të kalimit Qafëthanë me Republikën e Shqipërisë përmes lidhjes së Adriatikut, Durrës - Brindizi me Evropën Perëndimore dhe krijimin e korridorit Lindje –Perëndim me rëndësi adekuate konvergjente.
Zhvillimi i korridoreve të theksuara e tregon rolin transitor dhe ndërmjetësues të Republikës mes Evropës dhe Azisë dhe inkuadrimin e kapaciteteve ekonomike shtëpiake në proceset eurointegruese nga njëra anë, dhe intensifikimin e lidhjeve të brendshme interregjionale dhe nga ana tjetër aktivizimin e faktorëve për zhvillimin regjional sa më të balansuar.
Disa pozita gjeografike të pavolitshme kanë të bëjnë me; pozitën gjeografike (pa dalje në det), me ç'rast Maqedonia është e detyruar t'i përdorë portet e Selanikut dhe të Durrësit, si dhe rrugët hekurudhore vetëm në drejtim veri-jug, pasi që destinacionet tjera hekurudhore nuk kanë dalje gjer te vendet fqinje përveç në Mexhitlia në Manastir. Roli dominant i Anës së Vardarit si koridor i Vardarit dhe rëndësia e saj monocentrike në lidhje me koncentrimin e popullsisë, aktiviteteve ekonomike dhe aktiviteteve të shumta joekonomike, posaçërisht të qendrave urbane të cilat shtrihen në këtë hapësirë, siç janë qyteti i Kumanovës, Shkupit, Tetovës, Velesit, Negotinës, Kavadarit dhe Gjevgjelisë, pastaj koncentrimi i qendrave kulturore, ekonomike dhe politike të boshtit longitudinal me boshtet e tjera, kanë mundësuar që të bëhen ndryshime të shumta në lidhje me zbrazëtira demografike, sidomos të atyre vendbanimeve që nuk kanë pasur kushte për zhvillim etj.
Në sistemin RRTE (rrugët transevropiane), një vend me rëndësi zë magjistralja e ardhshme veri –jug, drejtimi rrugor E-75. Pika fillestare e kësaj rruge gjendet në Helsinki, por lidhja rrugore kryesore fillon nga Gdanjsku (Poloni) dhe mbaron në jug në Republikën e Greqisë, ku përmes rrugës detare korridori vazhdon drejt Afrikës, nëpërmjet Azisë së Vogël. Në përbërje të këtij korridori, në suaza globale, bën pjesë edhe korridori i hekurudhave të shpejta me një shpejtësi të planifikuar me mbi 160 km në orë, pastaj rruga ujore e cila e lidh lumin e Danubit me detin Egje dhe korridori telekomunikativ veri- jug, i cili në Shkup kryqëzohet me korridorin adekuat trans ballkanik.
Në trafikun rrugor përmirësime mjaft të rëndësishme mund të priten me realizimin e korridoreve rrugore nga sistemi RRTE (rrugët transevropiane) që kalojnë nëpër Republikën e Maqedonisë ose e tangojnë atë në afërsinë e saj. Rrugët ndërkombëtare që kalojnë nëpër Republikën e Maqedonisë E75- Gdanjsk, Katovicë, Bratisllavë, Budapest, Beograd, Shkup, Athinë, Kajro; E65- Malme, Pragë, Bërno, Bratisllavë, Zagreb, Rijekë, Dubrovnik,

Podgoricë, Prishtinë, Shkup, Tetovë, Ohër, Manastir, Lamje, Kalamat, Afrika e Jugut, E850- Brindizi (Itali), Durrës, Ohër (lidhje me E65); E871- Sofje (lidhje me E79, E80 dhe E83), Kumanovë(lidhje me E-75).
Rrugët ndërkombëtare që parashihet të kalojnë në afërsi të Maqedonisë janë: E80-Romë, Peskara, Dubrovnik, Podgoricë, Prishtinë, Nish, Sofje; E771 Bari, Tivar, Shkodër, Prizren, Prishtine; E90 -Palermo, Taranto, Igumenicë, Selanik, Aleksandri; E79-Sofje Blagoevgrad, Selanik (Pan European communication, 2002).
Pozita qendrore e Maqedonisë në suaza të Gadishullit Ballkanik mundëson që nëpër të, të kalojnë korridoret më të rëndësishme telekomunikative, siç është korridori telekomunikativ transballkanik lindje-perëndim, kurse mbi qiellin e Maqedonisë veç më ekzistojnë korridore ajrore ndërkombëtare interkontinentale me mundësi për zhvillim të mëtutjeshëm. Mungon një korridor ajror mjaft i rëndësishëm i cili Maqedoninë do ta lidhë me regjionin e Detit të Zi dhe me detin Adriatik.
Në këtë kontekst nëpër territorin e Republikës së Maqedonisë, rrugët trafikore të cilat kanë karakter ndërkombëtar për vendin tonë kanë rëndësi mjaft të madhe ekonomike.

RËNDËSIA EKONOMIKO-TURISTIKE E KORRIDOREVE TË MAQEDONISË

Sistemi ekonomik në Republikë është i lidhur ngushtë me korridoret trafikore të cilët për kushtet tona paraqesin akse të rëndësishme zhvillimore. Në dy dekadat e fundit, por edhe më herët, korridori 10 i cili paraqiste një nga vijat trafikore më të rëndësishme me karakter ndërkombëtar, sikur nuk i ka plotësuar rezultatet e pritura. Ky korridor ka rrënjë të thella në funksionimin dhe në zhvillimin e tij si dhe në transformimin e Povardaries. Përvojat europiane dhe botërore tregojnë se trasat rrugore me karakter ndërkombëtar, fuqishëm kanë ndikuar në zhvillimin e përgjithshëm të hapësirës, me ç'rast nuk është edhe me pjesën e mesme dhe jugore të Povardaries, sepse vendbanimet qytetare dhe ato fshatare kanë pësuar një proces mjaft të ngadalshëm të transformimit ekonomik të hapësirës.
Në rrethana të këtilla, kur vendi ynë ka vetëm një rrugë tradicionale magjistrale M1(E75), dhe në pamundësi që korridori 8 të funksionojë plotësisht, për shkak të pjesëve ende të pambaruara që janë në ndërtim e sipër, si në vendin tonë, po ashtu edhe në Shqipëri (në kushte të embargos ekonomike siç ishte rasti me Greqinë në vitet e nëntëdhjeta të shekullit të kaluar), mund të ketë probleme të mëdha ekonomike, gjatë aktiviteteve të tilla eventuale nga ana e Greqisë. Vlerësime të tilla kanë dhënë edhe institucionet më të larta shtetërore, odat ekonomike dhe sektori joqeveritar.

Në segmente të caktuara, siç është rasti me politikën monetare kreditore, gjendja është edhe më e keqe dhe kërcënimet e tilla mund të jenë katastrofale për ekonominë e Maqedonisë. Kështu p.sh. ndërmarrësit përveç kushteve të jashtme, posaçërisht embargos greke dhe tregjet e reduktuara, posaçërisht janë kritike me faktorët e brendshëm, të cilët e ngulfasin realizimin e aktiviteteve tona ekonomike. Mes tyre numërohen përdorimi mjaft i ulët i kapaciteteve, niveli mjaft i lartë i konsumit publik, aftësitë akumulative mjaft të ulëta ekonomike, mbipunësimi, pa mosfunksionimi e këtij korridori mjaft të rëndësishëm. Në kushte të këtilla institucionet shtetërore duhet më tepër të angazhohen në intensfikimin e punëve rreth ngritjes së këtij korridori (korridori 10) në nivel më të lartë transportues, me qëllim të vetëm për sigurimin e funksioneve të plota transportuese, nënkuptohet edhe të objekteve ndjekëse në vijën e përmendur trafikore (Panov N., 2007).

Porti i Selanikut dhe ai i Durrësit janë pikat e vetme më të rëndësishme përmes të cilave Republika e Maqedonisë mund të mbajë funksione ekonomike. Ndërmarrjet nga fusha e trafikut rrugor publik si dhe funksionet shtetërore në mënyrë permanente kanë probleme lidhur me sigurimin e efikasitetit më të lartë në kryerjen e procedurave doganore, thjeshtëzimin e formaliteteve dhe marrjen e TIR certifikatave për automjetet, sigurimin e korridorit transportues nëpër Republikën e Serbisë, Republikën e Greqisë nëpër këtë korridor, si dhe nëpër Republikën e Bullgarisë dhe Republikën e Shqipërisë, sigurimin e lejeve të mjaftueshme për kontingjentin e transportit, për zvogëlimin e të dhënave nga shteti në lidhje me të gjitha bazat e pikave kufitare, rrugëve dhe porteve në Bullgari dhe Shqipëri.

Për shkak se Maqedonia ka vetëm këto korridore magjistrale, nga ana e Greqisë shpeshherë ndodh t'i keqpërdorë marrëdhëniet fqinjësore me vendin tonë. Kështu p.sh. në vitin 1991 edhe atë gati për 2 vjet në pikën kufitare Idomen, në kufirin maqedono-grek, në stacionin hekurudhor në Gjevgjeli, ndonjëherë ndodhte që edhe me javë të tërë të mos i lëshonin cisternat me naftë të papërpunuar të cilat ishin të destinuara për tregun maqedonas. Por, në atë kohë ishte aktivizuar korridori 8, që përmes portit të Vlorës dhe atij të Durrësit në Shqipëri, Maqedonia furnizohej me resurset e nevojshme për zhvillimin e ekonomisë së saj.

Institucionet maqedonase si dhe ekspertët e përgjithshëm nga fusha e transportit, me të drejtë theksonin se përveç portit të Selanikut, Maqedonia duhet të angazhohet për përdorimin edhe të portit të Vlorës, sidomos për furnizim me karburant të lëngshëm dhe portin e Durrësit për mallrat e tjera të cilat janë të nevojshme për ekonominë e Maqedonisë. Në këtë drejtim janë arritur rezultate, sepse si në anën maqedone po dhe në atë shqiptare janë ndërtuar rrugë të cilat i plotësojnë kushtet transportuese.

KORRIDORI X

Korridori 10 është kalim shumë shekullor civilizues për popujt dhe kulturat. Për këtë kanë ndikuar karakteristikat morfologjike të luginës së lumit Vardar. Në këtë luginë që në kohën e Perandorisë Romake, por edhe më herët, ka ekzistuar rrugë e cila i ka lidhur popujt e ndryshëm, ekonomitë dhe kulturat nga Evropa e Mesme dhe Juglindore me vendet nga Mesdheu dhe Lindja e Afërt. Ajo në të kaluarën ka qenë e njohur si Via Singidinim – Naisus – Shkupi – Vilazora - Thesaloniki. Në kohën e ish Jugosllavisë, nëpër luginën e lumit Vardar me ndryshime të pakta, pothuajse në të njëjtën trase është ndërtuar magjistralja "Vëllazërim-Bashkimi", që sot njihet me emrin si Magjistralja 1, (M1), kurse në Evropë njihet me termin E-75.

Tabela 1. Rrugët magjistrale në Republikën e Maqedonisë (Zimeri Z, 2008)

Numri	**Drejtimi rrugor**	**Gjatësia në** km	**Nga cila autostradë**	**Nga cila rrugë Evropiane**
M1	Tabanovc.-Kumanovë.-Milad.-Veles-Gjevgjeli (E-75)	174,2	87,4	174,2
M2	Kumanovë-Rankovë-K.Palankë-Deve Bair (E-75)	73,8		73,8
MZ	Petrovec-Hipodrom-Shkup-Bllacë (E-75)	40,3	14,2	19,0
M4	Milad.-Shkup-Teto-Gost – Kërç.;Podmolje -Strugë-Qafëthanë; (E-65=165,1 km; E-852=20,2km)	194,1	60	176,3
M5	Podmolje-Ohër.-Resnjë-Manas-Pril-Vel-Shtip-Koçan,Dellçevë, kufiri me Bullgarinë. (E-65=Manastir-Mexhitlia)	332,2		97,9
M6	Shtip-Rad-Stru-N.Selo-kufiri me Bullgarinë;	94,4		
Gjithsej		**909km**	**161,6km**	**541,2km**

Rrjeti rrugor në Republikën e Maqedonisë ashtu edhe siç përmendëm më lartë ka funksionuar që në kohën e periudhës romake. Është me interes të potencohet se në këto akse dhe në këto rrugë edhe në ditët e sotme shpesh kalojnë edhe rrugët moderne. Fillimisht nga Shkupi drejt veriut shpiente një

rrugë me rëndësi drejt luginës së lumit Morava. Këtë rrugë e vërteton edhe pozita e sotme e Shkupit dhe Scupi romak, si dhe vendbanimet e vjetra në suaza të fushëgropës së Shkupit.
Të gjitha rrugët e rëndësishme janë lëshuar drejt korridorit 10, respektivisht drejt rrugës magjistrale M1 (E75). Si drejtim rrugor më me rëndësi ishte drejtimi Tabanovc-Kumanovë-Milladinovc-Veles – Gjevgjeli. Megjithatë, një pjesë bukur e madhe e rrugëve edhe më tej kanë mbetur si tokë dhe pa ura, me ç'rast lëvizja përmes tyre është mjaft e vështirë.
Rrugët magjistrale paraqesin shtylla kryesore të rrjetit rrugor të Republikës së Maqedonisë. Ato janë rrugë publike që lidhin fusha të caktuara ekonomike në shtet dhe më pas lidhen me rrugë të shteteve fqinje. Maqedonia është e lidhur me 6 drejtime rrugore magjistrale me gjatësi prej 910 km.
Rruga magjistrale M-1 (E -75) shpie nga Tabanovci përmes Kumanovës-Milladinovcit-Velesit dhe Gjevgjelisë gjer te pika kufitare Bogorodicë të kufirit maqedono-grek, ku gjatësia e përgjithshme e kësaj rruge arrin në 174.2 km ose 19.1% e gjatësisë së përgjithshme të rrugëve magjistrale të vendit tonë.
Prej kësaj rruge 87.4 km është autostradë, ku me tërë gjatësinë inkuadrohet në rrjetin rrugor evropian dhe njihet me emrin E-75. Në vitet e shtatëdhjeta nga shekulli i kaluar filloi modernizimi i saj dhe gjer më tani është kryer në pjesën Kumanovë-Petrovec-Veles-Gradsko dhe Gjevgjeli-Bogorodicë, kështu që në këto pjesë ekziston edhe aksi i dytë rrugor edhe në relacionin Gradsko gjer në Demir Kapi.
Rruga magjistrale M-1 kalon nëpër 12 komuna dhe përfshin fushë gravituese prej 3348 km, ose 13.0% nga territori i tërë shtetit. Duke filluar nga Gdanjsku në Poloni në bregun e detit Baltik, përmes Varshavës-Bratisllavës-Budapestit-Beogradit – Shkupit gjer në Athinë në bregun e detit Mesdhe në Greqi. Rruga E-75 paraqet lidhje më të rëndësishme për Maqedoninë me vendet nga Europa Perëndimore dhe Veriore nga njëra anë dhe nga ana tjetër drejtpërdrejtë e lidh Maqedoninë me Greqinë dhe Mesdheun.
Rruga magjistrale M-2 shtrihet prej Kumanovës përmes Rankovcit- Kriva Pallankës gjer në Deve Bair me gjatësi prej 73.8 km, e cila përputhet dhe paraqet pjesë nga rruga ndërkombëtare E-871. Me këtë rrugë magjistrale Republika e Maqedonisë lidhet me Bullgarinë dhe kryqëzohet në M-1 në Kumanovë.
Rruga magjistrale M-3 fillon nga Petroveci dhe shpie përmes Shkupit gjer në kalimin kufitar të Bllacës në kufirin maqedono-kosovar. Kjo rrugë ka gjatësi të përgjithshme prej 40.3 km nga të cilët 14.2 km janë autostradë, kurse 19 km janë pjesë nga rruga ndërkombëtare E-65. Përmes kësaj rruge magjistrale, Maqedonia lidhet me Kosovën, Malin e Zi dhe bregdetin Adriatik.

Rruga magjistrale M-4 i takon korridorit-8, e cila fillon nga Milladinovci dhe shpie përmes Shkupit-Tetovës-Gostivarit-Kërçovës-Podmoljes-Strugës gjerë në Qafëthanë të kufirit maqedono-shqiptar. Kjo rrugë magjistrale ka gjatësi të përgjithshme prej 194.1 km, prej së cilës autostradë është 60 km e pjesës mes Shkupit- Tetovës-Gostivarit, kurse 156 km janë pjesë të rrugës evropiane E-65 dhe 20 km janë pjesë nga E-852.

Rruga magjistrale M-5 fillon nga fshati Podmolje në Ohër dhe shpie përmes Ohrit-Resnjës-Manastirit-Prilepit (përmes Babunës)-Velesit-Shtipit-Koçanit-Dellçevës gjer në pikën kufitare të kufirit maqedono- bullgar. Në Manastir ndahet një degë nga kjo rrugë dhe shpie gjer në Mexhitlia të kufirit maqedono-grek. Gjatësia e kësaj rruge arrin në 332.2 km dhe paraqet rrugën magjistrale më të gjatë në vendin tonë.

Rruga magjistrale M-6 fillon prej Shtipit e cila shpie përmes Radovishit dhe Strumicës gjer në Novo Sellë të kufirit maqedono -bullgar. Gjatësia e saj arrin në 94.4 km.

Në bazë të rezultateve nga tabela e lartpërmendur, rrjedh se gjatësia e përgjithshme e rrugëve ndërkombëtare në hapësirën e Republikës së Maqedonisë arrin në 541 km. Praktikisht, kjo gjatësi rrugore e rrugëve magjistrale është pjesë përbërëse e rrugëve të përgjithshme magjistrale në hapësirën e Maqedonisë. Rrugët ndërkombëtare të cilat lidhen mes tyre në hapësirën e vendit tonë janë; E-75, E-65, E-850, E-871.

KORRIDORI VIII

Ky korridor paraqet pjesë integrale të rrjetit panevropian me dhjetë korridore transporti që kalojnë apo pjesërisht prekin tre korridoret e rrugëve magjistrale nr. 4,9 dhe 10. Shembull, pjesa Sofje-Plovdiv korridori 8 është gjithashtu pjesë e korridorit 4, dhe mundëson lidhje direkte mes Nishit dhe Stambollit në një pjesë të korridorit 10 në Maqedoni. Korridori 8 kalon edhe nëpër pjesët kryesore të korridorit 10. Gjatësia e përgjithshme e Korridorit 8 është mes 1.220 dhe 1.350 km, varësisht nga karakteristikat specifike të disa pjesëve nga rruga kryesore dhe hekurudha. Shtrihet nga deti Adriatik, mes Tivarit dhe Brindizit, ku rruga e saj kryesore kalon nëpër Shqipëri, Maqedoni dhe Bullgari dhe e lidh vijën Durrës-Vlorë në Tiranë, Shkup, Qafëthanë, Sofje, Plovdiv dhe Burgas-Varna pjesë nga Deti i Zi. Korridori 8 ka disa komponente dhe përfshin porte, autostrada, hekurudha, aeroporte, si dhe elemente të tjera që kanë të bëjnë me infrastrukturën trafikore, si kapacitete për servisim për të kontrolluar trafikun. Diçka pak më shumë se gjysma e rrugës kalon nëpër Bullgari, kurse pjesa më e madhe e infrastrukturës së nevojshme rrugore dhe hekurudhore veç më është e formuar. Një e treta e pjesës së korridorit në Maqedoni me gjatësi prej 206

km, veç më janë kryer. Vlerësohet se 400 milion dollarë janë të nevojshëm për ndërtimin e infrastrukturës duke përfshirë edhe rrugët rreth Shkupit.

Iniciativa për zhvillimin e këtij korridori për transport lindje-perëndim rruga Itali-Shqipëri-Maqedoni-Bullgari dhe më pas të bëhet lidhja me Kaukazin dhe Lindjen e Afërt, daton që nga viti 1990. Projekti për herë të parë është përgatitur në nëntor të vitit 1991, në mbledhjen e ministrave të transportit të Shqipërisë, Maqedonisë dhe Bullgarisë mbajtur në Sofje. Më pas këtë iniciativë e kanë përkrahur edhe Italia, Turqia dhe Greqia. Vendimi për ndërtimin e korridorit 8 ishte i konfirmuar në konferencën tjetër panevropiane të ministrave të transportit në Kretë më vitin 1994, si dhe në konferencën e tretë në vitin 1997.

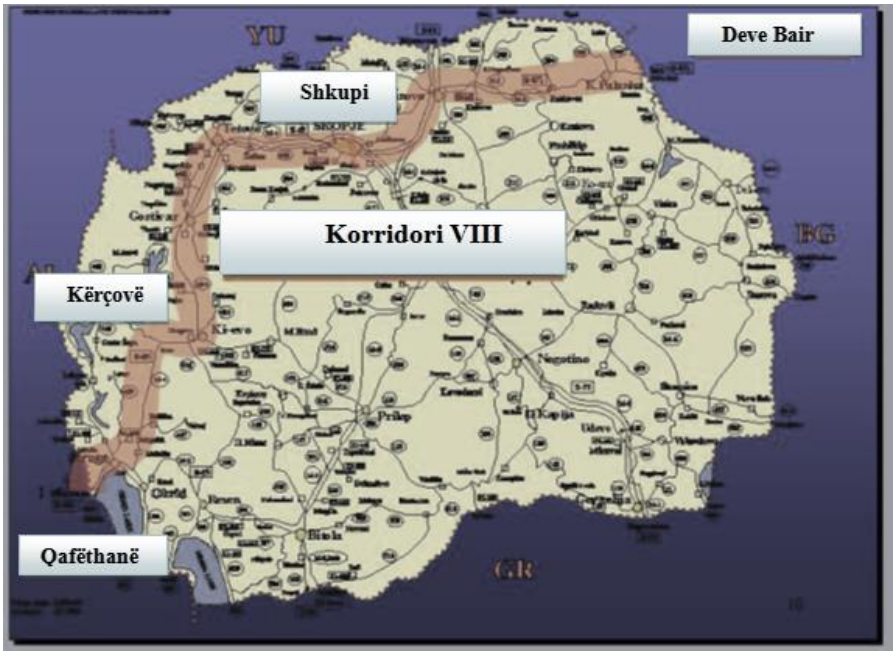

Fig. 1.Korridori 8 - që lidh pjesët lindore dhe perëndimore të ballkanit (Zimeri Z., 2008)

Për një kohë shtypi shqiptar i kushtoi rëndësi të madhe korridorit 8. Tre vjet më vonë në Nju Jork, presidentët e katër vendeve ballkanike të Shqipërisë, Maqedonisë, Bullgarisë dhe Turqisë në prezencë të presidentit amerikan Bill Klinton nënshkruan marrëveshje për projektin e ndërtimit të korridorit që do të quhej korridori 8. Ngjarjet turbulente në regjion e bënë disi të pasigurtë për një kohë ndërtimin e këtij projekti, por nga fillimi i këtij viti, korridori 8 veç më paraqet agjendë për Bullgarinë, Maqedoninë, Shqipërinë, Italinë dhe më gjerë.

Edhe pse Shqipëria është një vend i vogël, ajo do të shtrihet nëpër dy korridore të mëdha të Ballkanit, si në atë veri-jug dhe lindje-perëndim. Korridori veri- jug duhet ta shkëpusë Serbinë me Greqinë përmes Shqipërisë, kurse në lindje-perëndim me një emër tjetër korridori 8 fillon në Shqipëri prej Durrësit dhe kalon nëpër Shkup në portin bullgar të Burgasit dhe mbaron në Stamboll. Ekziston edhe një projekt, qëllimi i të cilit është që të ngriten vendet përmes gazësjellësit, gjë e cila është në kundërshtim me projektin e naftësjellësit që kalon nëpër Greqi.

Mes vendeve më me interes të lartë për korridorin 8 janë Shqipëria, Maqedonia dhe Italia. Sot, Shqipëria është vendi me gjatësi minimale të rrugëve dhe hekurudhave për kokë banori në Ballkan, dhe aq më shumë në krahasim me Evropën. Megjithatë, edhe pse Shqipëria është një vend tranzitor në aspektin e gjeografisë politike, në një shënim dekani C. Rugge një ekspert gjeopolitik, në një botim në "Gjeografia e Evropës Juglindore" vjen në përfundim se për herë të parë në histori përmes korridorit 8, Shqipëria mund të bëhet vendi më i rëndësishëm tranzitor. Shqipëria mund të bëhet një vend nëpër të cilin kalojnë apo fillojnë drejtime të rëndësishme komunikative, të cilat i lidhin vendet e ndryshme, por edhe kontinentet. Kjo mund t'i sjellë një zhvillim këtij vendi të varfër ballkanik edhe nëpër sektorët e tjerë. Rëndësia e korridorit për Shqipërinë nuk është vetëm në rritjen e rëndësisë së portit të Durrësit për shkak të zgjerimit, por paraqet edhe investim të madh . Përveç kësaj shumë kompani do ta gjejnë vendin e tyre në ndërtimin e këtij korridori dhe do të hapen një numër i madh i vendeve të reja të punës.

Porti i Durrësit në periudha të punës intensive mundëson kalimin e dy milionë tonelatave të mallrave (1989 -1995 në kohën e embargos greke ndaj Maqedonisë), kurse sot ka një rënie të një niveli më të ulët. Porti i Durrësit sipas projektit të korridorit 8 është i paraparë si port i tij apo si pikë fillestare, me një kapacitet të përpunimit të mallrave që mund të arrijë edhe në 6 tonelata për një vit. Këto janë arsyet që shqiptarët kërkojnë që t'u ndihmohet t'i modernizojnë kapacitetet e tyre prodhuese dhe të vendosin lloje të tjera transporti. Megjithatë, gjersa shqiptarët ishin më aktivë për ndërtimin e këtij korridori, grekët mundoheshin ta pengojnë ndërtimin e po të njëjtit nga frika se do ta humbnin portin e Selanikut. Si anëtare e BE-së që njëherit edhe do të jetë finansier i ri kryesor i këtij projekti, Greqia u mundua që ta zvarrisë implementimin e po të njëjtit. Athina, në pamundësi që të kalojnë nëpër territorin e saj, kërkonte të sigurojë së paku një nga vazhdimet që të shkojë gjer në Selanik.

Nga ana tjetër, Maqedonia me korridorin 8 i lehtëson mundësitë ekonomike nëse has në probleme me korridoret e tjera. Kështu gjatë embargos kundër Serbisë, u ndjenë pasoja në masë të madhe edhe në ekonominë e Maqedonisë. Nga ana tjetër marrëdhëniet e ndërlikuara me Greqinë, u

vështirësuan kushtet për dalje në detin Adriatik, në detin Egje dhe në Detin e Zi, që kanë rëndësi vitale për Maqedoninë.
Korridori 8 shihet si "Plan i Klintonit" për interesat amerikane, por edhe interesi i italianëve gjithashtu është i madh për ndërtimin e këtij projekti i cili mund të vërehet edhe nga deklaratat e kryeministrit italian Prodi, gjatë vizitës së tij në Shkup dhe në Sofje. Sipas një plani të përgatitur në mbledhjen e fundit të ministrave të transportit të katër vendeve, ndërtimi i korridorit do të kalojë nëpër tri faza.
Në fazën e parë prej vitit 1998-2003, do të bëhet rikonstruimi i rrugëve ekzistuese. Ne fazën e dytë prej vitit 2003-2010, do të bëhet zgjerimi i tyre dhe ndërtimi i rrugëve të reja. Në fazën e tretë prej vitit 2010-2020 do të bëhet rikonstruimi i porteve, ndërtimi i hekurudhave me një shpejtësi më të madhe dhe ngarkesë sipas standardeve botërore (A.Selmani, 2006).

KORRIDORI QENDROR

Korridori qendror në hapësirën e Republikës së Maqedonisë shtrihet gati se nëpër tërë pjesën qendrore të vendit me disa përjashtime të caktuara në pjesën jugperëndimore të tij. Ky korridor nuk ka një pozitë dinamike dhe nuk është frekuent në krahasim me dy korridoret tjera të cilat kanë frekuencë dhe dinamikë më të madhe dhe mjaft rëndësi për jetën ekonomike të vendit tonë. Ky korridor paralel me korridorin 8 i lidh pjesët perëndimore dhe lindore të vendit tonë, dhe njëkohësisht bën lidhjen në perëndim të Republikës së Maqedonisë me Republikën e Shqipërisë dhe më gjerë, dhe në lindje lidh Republikën e Maqedonisë me Republikën e Bullgarisë dhe më gjerë.
Në aspektin trafikor ky korridor i lidh pjesët perëndimore dhe lindore të vendit tonë, të cilat gjithsesi ndryshojnë sipas prodhimeve bujqësore, xeheve, pylltarisë, resurseve ujore etj.
Kjo rrugë ka qenë aktive që në kohën e periudhës romake dhe ka qenë e njohur si rruga Via Egnatia (një pjesë e saj gjer në Manastir, ose Herakleja). Në pjesën më të madhe të këtij korridori, sidomos pjesët magjistrale nuk i plotësojnë funksionet dhe kriteret evropiane e botërore, por për nevojat tona ky korridor sot dhe në të ardhmen do të jetë një shtyllë kryesore për pjesën qendrore të hapësirës së Republikës së Maqedonisë.
Via Egnatia ka qenë rruga kryesore romake në hapësirën e Maqedonisë së sotme, kjo është rruga e cila më parë e ka lidhur Romën-Durrësin-Vlorën-Elbasanin -Qafëthanën-Strugën-Ohrin-Pellagoninë (Heraklea-Manastiri i sotëm) -Selanikun dhe Konstantinopolin (Stambollin).

Një degë e saj është ndarë në fushëgropën e Prespës për në Korçë dhe Janinë, ndërsa në afërsi të Heraklesë rruga ka shpierë për në Prilep, kurse nga Prilepi përsëri është ndarë në dy drejtime rrugore: një degë shpie përmes Pletvarit në Stobi, kurse tjetra përmes Pisadit në Vilazora respektivisht në Velesin e sotëm.

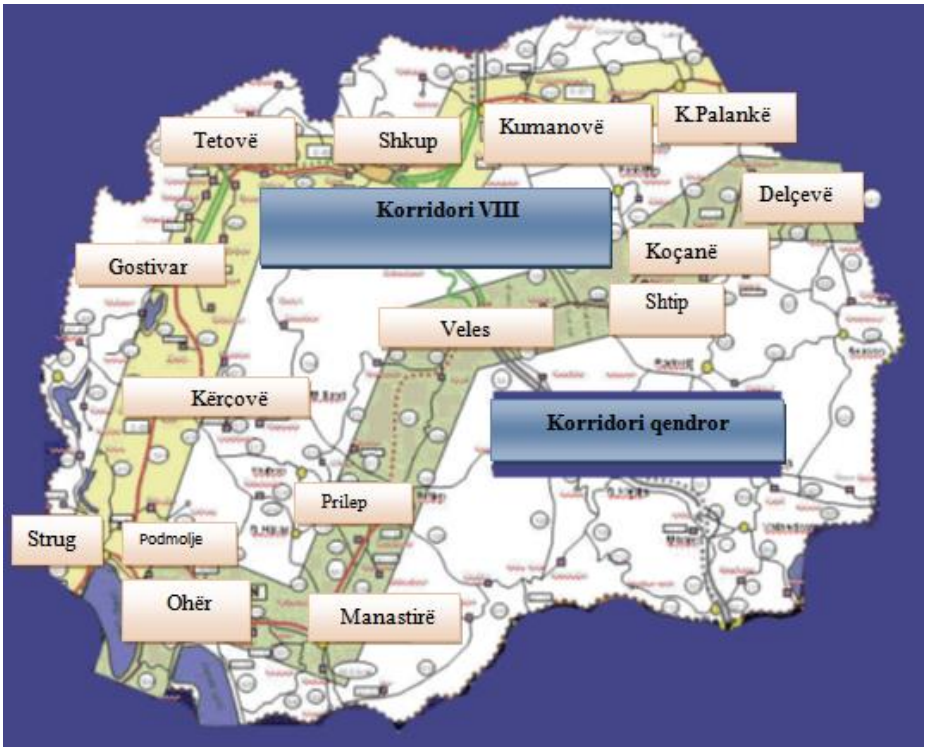

Fig. 2,Korridori 8 dhe korridori qendror (Zimeri Z., 2008)

Sipas nevojave ekonomike, ngadalë, por sigurt definohet korridori qendror i cili shpie nga Pogradeci-Ohri-Resnja-Manastiri-Prilepi-Velesi-Shtipi-Koqani-Dellqeva dhe më pas vazhdon në territorin e Republikës së Bullgarisë.

Në të vërtetë korridorin qendror e përbën rruga magjistrale M-5 që fillon nga fshati Podmolje i Ohrit dhe shpie përmes Ohrit-Resnjës-Manastirit-Prilepit (përmes Babunës)-Velesit-Shtipit-Koçanit-Dellçevës gjer në pikën kufitare në kufirin maqedono-bullgar. Gjatësia e përgjithshme e këtij korridori arrin në 332.2 km dhe paraqet rrugën më të gjatë magjistale në vend. Megjithatë duhet të theksohet se kjo magjistrale, siç përmendëm edhe më parë, akoma tërësisht nuk është e formuar dhe kryesisht ka të bëjë me pjesën e cila shtrihet mes Prilepit dhe Velesit përmes qafës Prisad në malin Babuna me

gjatësi të përgjithshme prej 80 km. Ky drejtim rrugor përmes Velesit e lidh Maqedoninë Perëndimore me atë Lindore, respektivisht i lidh territoret e 26 bashkësive lokale. Në të ardhmen konsiderohet se ky korridor do të ketë ndikim të madh në zhvillimin ekonomik të vendit tonë.

PËRFUNDIME

Korridori qendror në hapësirën e Republikës së Maqedonisë shtrihet gati se nëpër tërë pjesën qendrore të vendit me disa përjashtime të caktuara, ku si bariera kryesore merren procedurat administrative dhe pritjet e gjata ne ditët e nxehta verore që janë faktorë kryesorë për anashkalimin e udhëtimeve turistike në Repuplikën e Maqedonisë.

Rekomandimet: Turizmi bashkëkohor kërkon heqjen e kufijve-kontroleve, sigurinë e udhëtimeve, infrastrukturën e digjitalizuar të rrugëve, investime në objekte akomoduese –antropogjene, natyrë të pastër virgjine- të pashkelur në hapësirë të hapur, biodiversitet të pasur, kërkesë, ofertë dhe faktorë ndermjetësues të udhëtimeve-transport të gjerë në destinacione të caktuara, Ciceron, Agjent.tur.

CONCLUSIONS

Central corridor in the space of the Republic of Macedonia extends almost throughout the central part of the country with some certain exceptions, where as the main barriers are taken the administrative procedures and long waits in the hot summer days, which are key factors for bypassing the tourist trips in Macedonia.

Recommendations: The Contemporary tourism requires the border-controls to be removed, requires security for the travel, the digitized road infrastructure, investments in accommodation and anthropogenic facilities, pure mature virgin-without violating the open space rich diversity, requirement, offer, and mediating factor of travel, transport to the certain destinations, guide, tourist Agents.

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REDUKTIMI I COD ME SISTEMIN E TRAJTIMIT BIOFILMIK TË UJËRAVE TË NDOTURA URBANE

(COD reduction with biofilm treatment systems of urban wastewater)

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ABSTRAKT

Qëllimi i këtij punimi shkencor është të bëhet vlerësimi i performances së sistemit të trajtimit të ujërave të ndotura urbane me metodën e filtër me pikim (trickling filter) që shkarkohen nga qyteti i Skenderaj. Eksperimentet e kryera ne Impiant janë bërë për të vlerësuar performancën e ketij filtri aerobik dhe pjesët të tjera të sistemit anaerobe për largimin e kërkesës kimike për oksigjen (COD). Të dhënat e vlerësimit të performancës së filtrit janë të krijuara nën kushte të ndryshme eksperimentale. Një mesatare e efikasitetit të reduktimit të COD e 18 -30% është arritur në të gjitha përqendrimet e ujërave të ndotura në një ngarkes hidraulik prej 5.5 $m^3/(m^2 \cdot d)$. Rezultatet e çojn në një dizajn ngarkesë organike prej 0.96 kg $COD/(m^3 \cdot d)$ për të arritur një nivel të shkarkimeve në rangun e 50-120 mg/L. Siç mund të konkludohet nga rezultatet e këtij studimi, substancat organike mund të trajtohen në impinatin e trajimit të ujërave të ndotura në një mënyrë me kosto-efektive dhe ekologjikisht miqësore duke përdorur filtrin pikues me media plastike.

Fjalët kyçe: Filtrat pikues, trajtim Aerobic, ujërave të zeza, kërkesa kimike oksigjen (COD)

ABSTRACT

The purpose of this scientific work was to assess the performance of the system of wastewater treatment with trickling filter method (trickling filter) of urban waste

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water coming from the town of Skenderaj. Experiments done at the plant are made to evaluate the performance of aerobic filter and anaerobic systems for the removal of chemical oxygen demand (COD). The evaluation data trickling filter performance are generated under different experimental conditions. An average efficiency of COD reduction of 18 -30% is achieved in all concentrations of wastewater in a hydraulic loading of 5.5 $m^3/(m^2 \cdot d)$. Results lead to a design organic load of 0.96 kg $COD/(m^3 \cdot d)$ to reach a COD emissions in the range of 50-120 mg/L. As can be deduced from the results of this study, organic substances in the trajimit plant wastewater can be treated in a cost-effective and environmentally friendly using using trickling filters with plastic media.

Key words: Trickling filters, Aerobic treatment, wastewater, chemical oxygen demand (COD)

HYRJE

Shkarkimi i ujërave të ndotura në lumenj është shkaktari i degradimit të pakthyeshme që ndodhet në sistemet e ujërave sipërfaqësore (Rajaram dhe Ashutosh, 2008). Për shkak të përmbajtës që ujërat e ndotura mbartin me vete, lumenjët janë ndër trupat më të rrezikuara nga ndotja e ujit. Ka pasur dëmtime të konsiderueshme të lumenjve nga ndotësit, duke e bërë ujin të papërshtatshme për qoftë për pije, për përdorim shtëpiak, për ujitjen e tokave bujqësore, rekreative, për ujin e pijshëm dhe për shumimin dhe zhvillimin e kafshëve etj. Me rritjen e pamjaftueshme të furnizimit me ujë të trajtuar publik, uji i lumit të freskët është bërë një burim alternativ për këto qëllime (van der Bruggen dhe Braeken, 2006).

Zbërthimi i materijeve organike kerkonë shpenzimin e sasisë së oksigjenit të tretur në ujë që është jetike për botën ujore. Lirimi i komponimeve të azotit dhe fosforit që ndodhë si pasoje e ndotjes nga ujërat e ndotura gjithashtu stimulon rritjen e bimëve ujore dhe kontribon në eutrofikimin në lumenjë apo liqene. Largimi i komponimeve organike nga ujërat e ndotura është e rëndësishme për të shmangur kushtet anaerobe në ujërat pritëse. Ushqyesve të tilla si Azoti (N) dhe Fosfori (P) duhet të largohen për të shmangur lulëzimin e algave që prishin ekosistemin e ujërave (Driessen dhe Vereijken, 2003).

Proceset e trajtimit të ujërave të ndotura janë të prekur nga prania e azotit të amonit (NH_4^+ -N). NH_4^+ -N në këto ujëra mund të largohet duke rritur vlerën e pH dhe pastaj me ajër bënë zhveshjen e ndotjeve nga uji. Megjithatë, kjo metodë nganjëherë është mjaft e paefektshëm, në varësi të parametrave operacionale të përdorura, cilësisë e ujit, dhe kostoja që zakonish është shumë e lartë, veçanërisht në vendet në zhvillim (Zhao, 1999, 2001; Henry dhe Prasad, 2000; Zhao et al, 2000. ; Youcai et al, 2002). Gjithashtu në

literaturë është raportuar së në një sistem kompleks të trajtimit të ujërave të ndotura, llum aktiv normalisht ekspozon aftësi të dobët; si e tillë, sistemet e filmit fikse që do të përfshintë filtra pikues, kontaktoret biologjik të radhës, e të tjera, janë më të rekomanduara (Zurchin et al., 1986).
Në këtë studim, është bërë një hulumtimi i hollësishëm me qëllim të analizimit të performancës së media plastike të filtrave pikues në industrinë e trajtimit të ujërave të ndotura. Përveç kësaj, ne kemi për qëllim për të demonstruar përdorimin e filtrave pikues si një proces alternativ biologjik gjatë procesit të trajtimit të ujërave të ndotura, veçanërisht për vendet me të ardhura të ulëta. Ky studim është raporti i parë për reduktimin biologjik COD në një filter pikues duke përdorur një kulturë të përzier të mikroorganizmave me origjinë nga llumit të ujërave tëndotura.

MATERIALET DHE METODAT

Ujërat e ndotura urbane në Skendraj i janë nënshtruar rregullimit të pH duke kaluar në procesin e trajtimit biologjik që përbehet nga: grilat, sedimetimit primar, filtrave me pikim dhe sendimetimit sekondar, skemen e thjeshtë të procesit e kemi araqitur ne figurën 1. Mostrat e ujërave të ndotura që analizohen në baza ditor janë për COD, BOD 5-ditor (BOD_5), azoti i përgjithshëm (TN), dhe fosfor i përgjithshëm (TP). Trajtimi primar në Impiantin e ujërave të ndotura në Skenderaj realizohet me anë të rezervarit anaerobe apo rezervarit Imhoff që përfaqeson një metodë efektive për largimin e COD dhe lëndëve të ngurta pezullues. Rendimeti i dergradimit mikrobial anareob i lëndeve organike në këta rezervar varet nga kushtet e mjedisit për biogjenzën simbiotike të mikroorganizmave metanogjene dhe hidrolike. Gjithëashtu rezervaret Imhoff bëjnë të mundur dekatimin e një pjese të materialit të ngurtë që ndodhet në ujërat e ndotura. Në Impiantin e Skenderajit, rezervari Imoff edhe pse është ndertuar si një njësi e vetme e proçesit që zhvillohet në të është i ndarë në tri pjesë të cilat punojnë në kombinim me njëra tjetrën. Ai ka një thëllsi prej 3 metrash dhe një kapacitet mbajtës prej 12 000 m^3. Sasia e ujit të ndotur që është llogaritur pët të qëndruar në rezervari Imhoff është 4 500 m^3, pra sasia e ujitë të ndotur të grumbulluar në total në rezervarin Imhoff qëndron 48 orë.

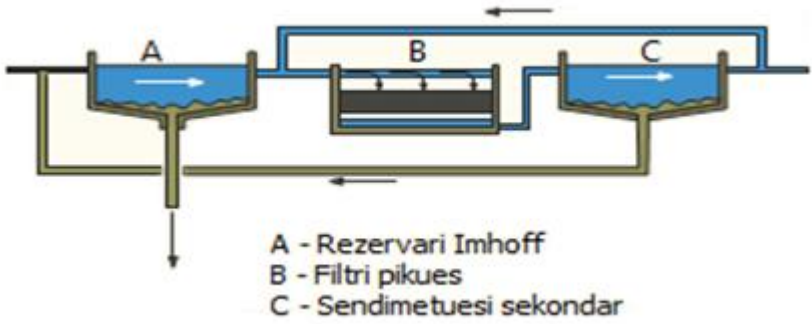

Figura 1. Skema e sistemit të trajtimit të ujërave të ndotura në Skenderaj

Proçesi i trajtimit vazhdon në filtrin me pikim që bazohet në biodegradimin e lëndeve organike që ndodhen në influent, nga një bashkësi mikroorganizmash që zhvillohen në një shtresë të hollë biologjike të fiksuar në sipërfaqën e materialit mbushës. Në impiantit e Skenderajit përdoret një materiel plastik në formë modulare. Hyrja e influentit në filter bëhet në formën e dushi me anë të një shpërndarsi të përbër nga katër krah që rrotullohet horziontalisht. Ujërat e trajtuara dhe mbetjet e mikroorganizmave pas kalimit të sipërfaqës së filtrit mblidhen në një sistem drenazhi dhe trasportohen tek dekatuesi sekondar. Në laboratorin e Impiantit kemi berë eksperimetet një herë në jave duke bërë matjen dhe analizimin e pH, përqendrimet e COD, BOD_5, TSS, TDS, Fosfori, Azoti, dhe temperaturës. Efiqencen e largimit të COD nga filtëri me pikim mund të llogaritet në bazë të reduktimit të përqendrimit të COD në influencë dhe në efluentin rrjedhës siç tregohet në ekuacionin a mëposhtëm:

$$COD_{e\ larguar} = \frac{c_{\text{në } hyrje} - c_{\text{në } dalje}}{c_{\text{në } hyrje}} \times 100\%$$

ku:

- $c_{\text{në } hyrje}$ është në përqendrimi në hyrje COD (mg / L) dhe
- $c_{\text{në } dalje}$ është përqendrimi rrjedhësnë dalje COD (mg/L).

REZULTATET DHE DISKUTIMI

Matjen e karakteristikave të përgjithshme të ujërave të ndotura në hyrje dhe dalje nga impianti i Skenderajit i kemi kryer në laboratorin e impiantit siq janë paraqitur në Tabelën 1. Majtet laboratorike i kemi fokusuar në

analizimin e karakteristikave kryesor siq janë BOD_5, COD, TDS,TSS, PO_4/P, N-total.

Tabela 1. Karakteristikat fizike-kimike të ujërave të ndotura në Skenderaj

Parametrat	Njësia	HyrjanëImpiant	DaljangaImpianti
COD	mg/L	76.5	53.2
BOD_5	mg/L	44.4	0.62
TDS	mg/L	106	103.2
TSS	mg/L	38.5	5.2
PO_4/P	mg/L	3.54	1.88
N-total	mg/L	17.2	13.3

Në grafikët në vijim do të paraqesim monotrimin e rezultateve të fituar për gjashtë muajt e fundit të vitit 2014 të faktorëve kryesorë që ndikojnë në normën elargimit COD. Qëllimi i këtij punimi është optimalizimi i parametrave fiziko-kimik gjatë procesit biologjik të trajtimit të ujërave të ndotura urbane për të arritur largimi e COD në normë të dëshiruar konform kufizimeve ligjore. Në figurën 2, do të paraqesim rezultatet e arritura në laboratorin e impiantit të Skenderajt, luhatjet e pH dhe ndikimi i tij paraqesin një faktor mjaft të rëndesishëm në shkallën e reduktimin e COD.

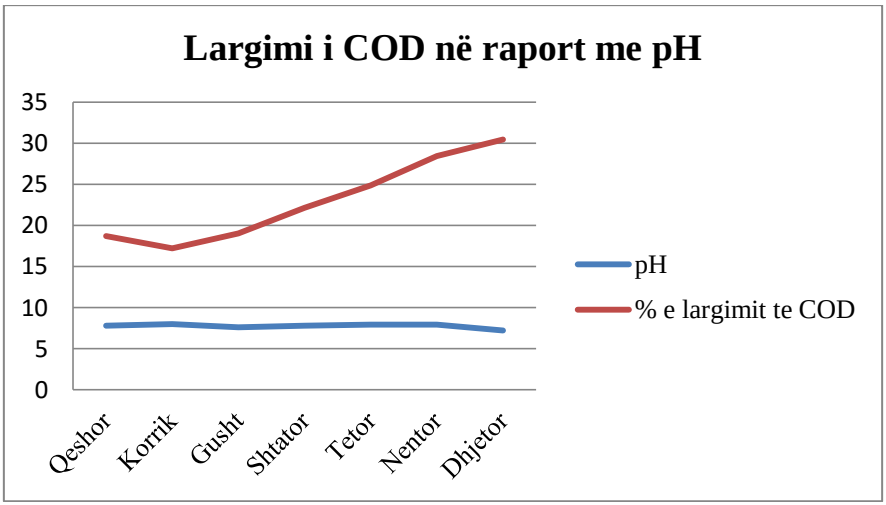

Figura 2. Luhatja e % së largimit të COD në raport me ndryshimin e vlerave të pH-ë

Një tjetër faktorë të rëndesishëm që ndikon në shkallën e largimit të COD nga ujërat e ndotura urban është temperatur . Në figuren 3 do të paraqesim raportin e reflektimin në mes të temperaturës dhe shkallës së reduktimit të COD.

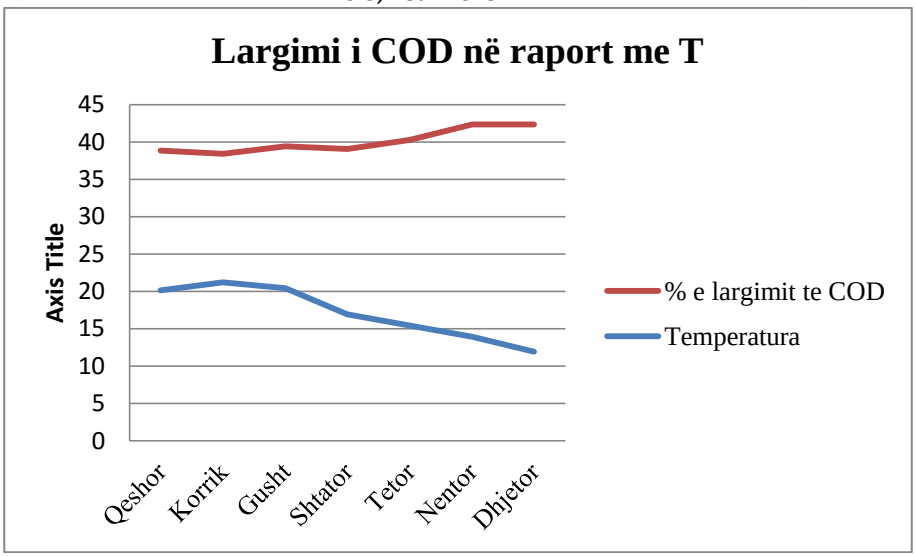

Figura 3. Luhatja e % së largimit të COD në raport me ndryshimin e vlerave të pH-së

Një tjetër parameter që kemi analizuar në hulumtimin tonë është edhe raporti në mes ngarkesës hidraolike dhe shkallës e reduktimit të COD. Në figuren 4 kemi paraqitur hulumtimin i cili po ashtu i përketë të njëjtës periudhe kohore sikurse edhe dy parametrat e ma sipërme pH dhe T.

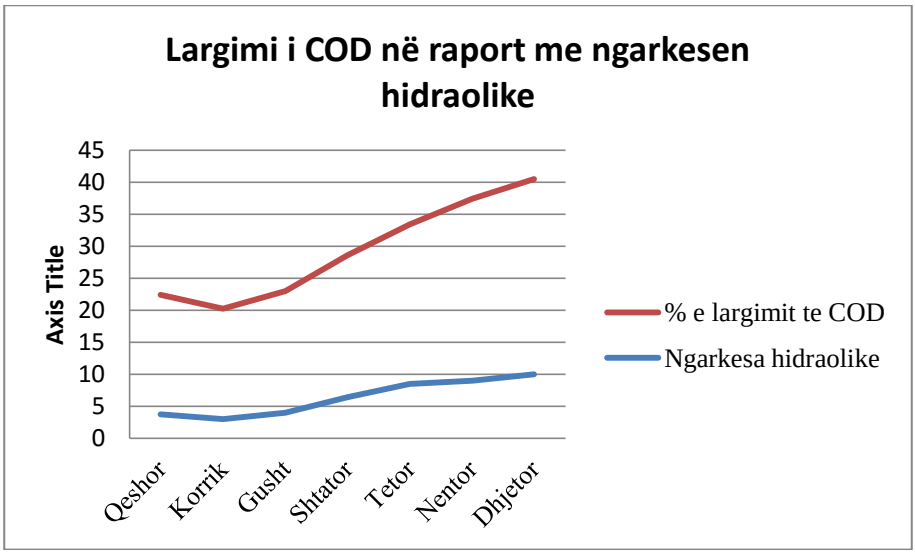

Figura 4. Luhatja e % së largimit të COD në raport me ndryshimin e vlerave të ngarkesës hidraolike

KONKLUZIONE

Ujërat e ndotura në vete përmbajnë materie organike dhe ushqyes të tjerë të cilët posa të arrijnë në lumenjë dhe oqeane, atëhere fillojnë procese të shumta biologjike dhe kimike, të cila çojnë në sosje e oksigjenit në ujë. Nëse shumë prej këtyre substancave shkarkohen, kjo përfundimisht do të çojë në një mjedis pa oksigjen i cili është fatal për organizmat ujorë.Për të parandaluar këtë skenarë, impianti i trajtimit të ujërave të ndotura në Skenderaj zhvillon procese që parandalonë konsumimin e oksigjenit, duke mos shkaktuar mungesen e tij për lumenjë dhe oqeane. Me anën e ketij punimi kemi analizuar dhe kemi nxjerrë disa përfundime për rolin e parametrave fizik siq janë pH, T dhe ngarkesa hidraolike në shklalen e largimit të COD në impiantin e Skenderajit.

Monitorimi i efektit të pH në shkallën e redukimit të COD në filtra me pikim u shqyrtuar për një periudhe kohore prej gjashtë muajsh. Siç mund të shihet në figura 3, efikasiteti i reduktimit të COD është ruajtur në një vlerë të lartë, 17 -32% në mes pH 6.00 dhe 8.00. Aftësia optimale e largimit arrihet kur vlera e pH është nën vlerë prej 7 dmth kur ujërat e ndotura i takojnë mesit neutral duke synuar që ky mes te jetë acidik. Kjo është për shkak të dy arsye: në grupe të ndryshme të mikroorganizmave autotrofe dhe heterotrofe dominojnë aktivitetet në vlera të ndryshme pH; nga ana tjetër, shkalla e disponueshmërisë së substrate të ndryshme është i ndryshëm në vlera të ndryshme pH në biofilm të lagësht ku biodegradimi zhvillohet. Për të përfunduar, reduktimi i COD kryhet mirë në varg pH e 6.30-7.00, në vlerat e tjera të pH-së nuk ka pasur reduktim të konsiderueshme të COD nga ujërave të ndotura, duke treguar se sistemet me filtra pikues ishin në gjendje për të përballuar në mënyrë efektive ndryshimin e imponuar të pH.

Temperatura është një parametër shumë i rëndësishëm gjatë vlerësimit të efikasitetit të përgjithshëm të procesit të trajtimit biologjik. Temperatura ndikon në aktivitetet metabolike të popullsisë mikrobiale dhe gjithashtu ka një efekt të thellë në faktorë të tillë si normat gazi-transferimit dhe karakteristikat tretjës së lendeve të ngurta në menyrën biologjike (Metcalf & Eddy, 1991a; Crites dhe Tchobanoglous, 1998). Rezultati i hulumtimit tone kanë treguar se proceset me filtër me pikim efikasiteti i reduktimit të COD është arritur kur vlerat e temperaturave janë jo me të larta së 10^{o}C. Siq shihet nga figura 3, raporti i reduktimit të COD ne temperature të ndryshme duket keshtu 17 - 32 % në mes 12^{o}C dhe 22^{o}C. Aftësia e reduktimit optimal do të arrihet kur vlera e temperatures të jetë në 10^{o}C që do të reduktoi mbi 35% të reduktimit të COD dhe vlerat e tjera janë të afërt me njëra-tjetren, duke treguar se temperatura vetëm shfaq një efekt të rëndësishëm në performancën e filtrit pikues për gamë të caktuar të temperaturës.

Performanca e sistemit me filtra pikues është monitoruar për 6 muaj, duke u fokusuar në raportin në mes të ngarkesës hidraolike dhe shkallës së reduktimit të COD. Analizimi i rezultateve kanë treguar se filtri me pikim efikasiteti i reduktimit të COD është arritur kur vlerat e ngarkesës hidraolike janë jo të ulëta ne rastin tonë 2 – 12m^3/d.Gjatë këtij hulumitimi kemi ardhur në përfundim së sa me e madhe të jetë rrjedha e ngarkesësë hidraolike aq me i lartë do të jetë edhe përqindja e reduktimit të COD në filtrat pikues.

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ISSN: 1857-9000 (versioni i printuar)
EISSN: 1857-9019 (versioni elektronik)
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INTERNATIONAL SCIENTIFIC JOURNAL
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ISSN: 1857-9000 (printed version)
EISSN: 1857-9019 (electronic version)
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