WRITING THE HISTORY OF BALKAN LANDSCAPES THROUGH PHOTOGRAPHY (20th-21th C.)

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Abstract

Knowledge of landscapes evolution can be useful for environment or geoheritage management or protection. It can provide also key-information to foresee future dynamics and evolutions or a framework to analyse environmental perception and sensitivity. Photograph, combined with other documentary sources as old maps, satellite images or travellers' narratives is one of the best mean to document changes that occurred over the 150 last years. This contribution will present some historical photographic archives available for studying Balkan landscapes from the beginning of the 20th century onwards, but that remain little known and used. The integration of data into a geographical information system (GIS) allows the assessment of landscape evolution and comparisons both in time and in space. Through two case studies selected in North Macedonia, we will show that diachronic analysis may concern both vegetation covers, and changes that have affected river system. These examples document the great changes that occurred in landscapes through the 20th century. They could contribute both to a better knowledge of biophysical processes over the "longue durée", by connecting to geoarchaeological or palaeoenvironmental researches, both to writing an environmental history of this part of Europe.

Keywords: Landscapes history, photography, military archives, First World War, North Macedonia.

INTRODUCTION

Recent evolution of landscapes remains little studied in the Balkans and, more broadly, in South-Eastern Europe while very many researches were conducted on ancient history in this region. Environments around archaeological sites are finely reconstituted thanks to geoarchaeological and palaeoenvironmental studies [4], [5], [12], [16]. However, changes which occurred during the contemporary period have been addressed only very rarely, and with some exceptions [1], studies relate mainly to the second half of the 20th century [2], [6], [7], [8]. Yet, we cannot ignore the interest of better knowing recent past, which landscapes and current dynamics are a direct legacy. Current environmental trajectories are partly controlled by past interactions between human pressures and biophysical processes. A historical approach therefore provides a framework for a better understanding of the current landscape as it has

been shown by numerous studies in Western Europe [10]. It can be applied to various themes: evolution of plant cover (wooded areas, nature of vegetation, etc.), river dynamics and metamorphoses, hydraulic installations, coastline evolution, urbanization, natural hazards and risk evaluation (flooding, fires, mass soil movements). Such an approach of environments or landscapes also makes it possible to characterize the heritage (architectural, cultural or a geo-heritage) and to assess evolutions of sites and possible threats (impacts of land use planning, extractive activities) [18]. The paucity of researches may be explained by the implicit idea that Balkan environments and landscapes remained relatively "natural" until the beginning of the 20th century, because Ottoman empire did not experience industry development, unlike to Western Europe. Human impact or pressures may thus appear discreet in the past,

which does not mean that they have not played a role. Moreover, documentary archives commonly used for addressing environment history in Western Europe do not have always their exact equivalent in Eastern Europe (eg: plans and projects of hydraulic engineers, forest statistics since the second half of the 18th century) and this can have limited the researches. There are maps dating from the second half of the 19th century, notably those ordered by Ottoman Empire from Austrian or French cartographers but they are in general not very precise due to their geographic scale. But above all, there is a lack of knowledge on documents that could be used, if only in Austrian or Ottoman archives [9]. Engravings and paintings or old photographs have been already used to characterize landscape changes, especially in Greece [7]. There are indeed many drawings and photographs

respectively since the 18th century and the 1850s. Some authors have also used descriptions left by travellers or scientists to reconstruct main features of landscapes or environments in eastern Mediterranean basin over the past three centuries [7], [11]. However, these sources provide information which remains qualitative, punctual and which can be subjective, in particular in the case of descriptions or travel narratives. On the other hand, if information is abundant for sites located on the main routes taken by travellers, other regions often remain very poorly described, perhaps ignored. This contribution aims to present cartographic and photographic archives dating from the beginning of the 20th century and still little known. They may allow to specify the evolution of Balkan landscapes over the past 100 years.

MATERIAL AND METHODS

A forgotten front

Historical documents used here are French archives dating from the First World War. During this conflict, important military operations were carried out in eastern Mediterranean, first in the Dardanelles then, after the failure of this offensive in 1915, on a front which took up position north of Thessaloniki, on either side of the current border between Greece, Albania, North Macedonia and Bulgaria. The Front d'Orient, or the Balkans campaign or even the Salonika front, as it was then called, has been far less regarded by historical studies than the Western front located in France [17]. This may explain why archival documents are still largely unknown to researchers and that they have hardly been used

so far. From the winter of 1916, the opposing armed forces established, as on the Western front, in a war of positions and developed a network of fortifications (figure 1), communication routes (roads and small railways), camps to house soldiers, sometimes even drainage works in some marshy areas (Axios delta, Bitola basin, etc.). Many intelligence operations on enemy lines are carried out (either by land approach or by aerial reconnaissance), in order to prepare artillery fires. Precise topographic studies are conducted to organize defences (installation of mountain batteries) and know the terrain before deciding an attack.

Figure 1. Extract from a French military map of the Balkan campaign, Kukurecani sheet, 1: 20000, 2nd edition of May 1917, completed on January 29, 1918. In blue the German and Bulgarian positions, in red the French positions. Source – Service Historique de la Défense.

Landscape views through military archives

This intense activity which lasted from late autumn 1915 to mid-September 1918 produced a mass of documents which are today preserved in the Service Historique de la Défense, in Vincennes (near Paris). They allow researchers to examine many environmental issues, a century later. These archives consist of descriptive reports, drawings

made in the field, aerial or ground photographs and, naturally, plans and maps (figure 1). To the extent that they had a military purpose, documents are generally very precise. Aerial photography has been used systematically to produce topographic maps using the photogrammetry technique. Until that point, the Austrian map at 1:200000 was the only

one available, but its precision was insufficient to organize military control of the ground. Aerial photographs were taken at low altitude and allowed to acquire detailed information about land, vegetation, agricultural developments and also fortified positions. We can only regret that a very large part of these photographs was destroyed during the bombings of the Second World War. Maps were published at a scale of 1:20000, sometimes 1:10000, which gives them a very high reliability, in particular on constructions or small topographic landforms. The precision of landscape depictions is also interesting and it may be recalled that certain military artists, at that time, were specialized in topographic drawing. Archives also contain photographic panoramas (assembly of series of photographs taken from an observatory) of mountain areas which give, for example, a precise view of erosional landforms and plant cover. The area covered by these archives corresponds to the

sector of the front which was controlled by French forces, that is to say, from West to East, from Lake Prespa to Thessaloniki including Bitola (Monastir) and, from South to North, from the Axios delta to hills located south of Gevgelija. Documents are also available, more punctually, on the Vardar valley where French troops entered during the autumn of 1915, before the Serbian retreat – particularly from Demir Kapija (Demir Kapu) sector - then again after mid-September 1918 during the offensive which ended the war - Gradsko-Veles-Skopje sector. Besides these documents produced by the armies for the needs of military operations, one can also collect photos taken during troops movements or from the positions they occupied. They were printed to serve as souvenirs for soldiers or to be sent as postcards to their families. Although views of villages or daily scenes are very frequent, many pictures are of real documentary value for studying landscape history (figure 2).

Figure 2. German postcard from 1916-1918 showing a view of Gradsko and the Vardar valley. On the right, the railway station, an important center of military logistics during First World War; in the background, the river landscape of the early 20th century. See on figure 4 for the view orientation.

From spatial information processing to historical landscape analysis

All of these documents thus offer numerous possibilities for comparison with current landscapes. For a first approach, we compared with

satellite images available on Google Earth, which give views of local environment a century after the end of the First World War. Maps, aerial

photographs and satellite images have been integrated into a GIS to be georeferenced and to allow mapping of landscape changes. Old photographs were generally taken at low altitude and have thus a good accuracy which is a real advantage for georeferencing process. However, changes in land use (shape of fields, plant cover) sometimes give difficulties for some places. On the other hand, ground photographs provide useful information helping interpretation of aerial pictures, for example, to specify the nature of plant cover or to show the general context of an area covered by some isolated aerial photographs. The two examples presented here were selected in North Macedonia. The first is an area located near Kukureтчani (7 km north of Bitola) at the foot of

the reliefs which dominate Pelagonian basin and Cerna river. The study was carried out from a photo dating from February 1918 and from the more recent image available on Google Earth, dating from October 2019. During winter of 1916, the front line was settled on these reliefs (figure 1) and many reconnaissance overflights were conducted in this small mountainous area. The second is a reach of Vardar valley located in front of Gradsko, and studied from an aerial reconnaissance photograph taken in June 1918 and the satellite image from June 2009. During the First World War, Gradsko was a strategic position in Vardar valley and French planes conducted overflights of this sector to prepare later bombing.

RESULTS

Kukureтчani sector

The comparison between 1918 and 2019 pictures (figure 3) allows us to clearly observe the landscape changes on the western side of Pelagonian basin. In 1918, the surrounding area of Kukureтчani was characterized by an almost total absence of woods, as on all nearby reliefs. There are very sparse thickets, only located on north-facing slopes. There is no tree vegetation in talwegs but we cannot exclude that many trees have been cut for fuelling soldiers based in tents camps. Slopes are eroded by many gullies which produced some badlands areas. Past land use is clearly visible: principally grazing on slopes and dales, cultivated fields at the foot of reliefs.

Anthropogenic landforms (lynchets) linked to ploughing and agricultural erosion in fields appear finely near the village. As we find the

same microforms on the hillsides (southern part of the photo), we can deduce that ploughing was practised even on fairly steep slopes. The absence of trees near Kukureтчani suggest that cereal or pulses crops were the main productions. On reliefs, there is a very high density of military works (trenches on the ridges, batteries, pillboxes and a camp built on the sheltered side of a small valley. We also note that the village of Kukureтчani (the southern half of which is shown here) was entirely destroyed by bombing. Indeed, the fighting around Bitola (former Monastir) was very intense and destructive. Topographic maps of this region report besides many other destroyed villages around the swampy plain of the Cerna river.

Figure 3. Landscape changes near Kukurechani, between 1918 and 2019. Sources: Service Historique de la Défense, Google Earth. Numbers at the bottom of the archive photo indicate the position of artillery batteries (see also figure 1).

In 2019, the landscape is marked by a great increase in woods cover which also appears much denser than in 1918. In the area visible on figure 3,

spontaneous afforestation represents the only factor of this progression. But in the surroundings, satellite images show very large perimeters of reforestation.

On most of the slopes, erosion seems to be less active because we cannot report any new gully nor any increase in size of those already existing in 1918. To some extent, shrub encroachment into badlands and talwegs (where plant cover is now very dense) suggests a tendency towards natural stabilization and a lull in geomorphic processes. On the other hand, we note the important progression of a rotational landslide located at the southern limit of the studied site. In 1918, active scarp was only visible on the left bank slope of this valley. Now, several other long scarps indicate that the active part of this landslide has extended (or reactivated)

on the right bank slope, affecting a broader area. The slipped mass even erased gullies which had previously developed in its main body; a little but well-shaped toe progressed downstream towards an area cultivated in 1918. This shows that slipping is active under current conditions, as in many other sites of the country [13]. Another interesting point is that part of the trenches and military works is still very visible in current landscape because the vegetation recovery has been quite limited on the ridges. Like in the case of Verdun site in France, we could consider this little mountain as a memorial landscape of the First World War (figure 1).

Vardar Valley in Gradsko

In Gradsko sector, available documentation allows to perceive major changes that have affected fluvial landscape from the beginning of the 20th century (figure 4). In June 1918, Vardar riverbed was 110 m wide on average and has a low sinuosity (sinuosity index: 1.15). Unvegetated point bars and lateral bars were the main fluvial landforms. Bars platforms are occupied only by herbaceous plants and shaped by chute channels. Tree vegetation consisting of a few large poplars or groves of willows covered only small areas, as shown by the figure 2. Shrubs covered broader surfaces but, as the large trees (*Populus* or *Salix*), they were rather located in the benches than along river banks. The riverbed also seems shallow as far as we note a mill dam crosses it over almost its full width. Outside this area, many other old photos suggest that similar features also characterised the whole valley of the Vardar river (many other mill dams, fordable ways). Given that a main channel concentrates the major part of the flow (what also appears in the other photos or maps of the Vardar river), it is rather a wandering bed than a braided one in the strict sense of the term. But the numerous unvegetated

banks, and the weak presence of riparian vegetation evoke a certain sedimentary abundance and a fairly frequent renewal of fluvial landforms. We can correlate this with watersheds land-cover, which, according to photographs of the beginning of the 20th century, seem to have been much less vegetated than today, therefore more favourable to erosion. However, this aspect of the bed may be partly due to the great flood which occurred in mid-May 1916, only 2 years before the photo was taken. A century later, the Vardar river has a narrower bed (65 m on average, therefore a reduction of 41 % compared to its width in 1918) and more sinuous (sinuosity index: 1.38 so classifying it in the twisty type). We note that channel has shifted over 400 meters, developing very marked sinuosity towards both the left and the right banks, and causing the disappearance of floodplain sectors which were grazed or cultivated in 1918. An island has formed while, at the same time, the major part of unvegetated fluvial landforms which were located on both sides of the channel largely disappeared. These units currently represent only 20 % of the surfaces they covered in 1918.

Figure 4. Fluvial landscape changes in the Vardar river valley in Gradsko, between 1918 (A) and 2009 (B);
 1: river bed; 2: unvegetated point bar; 3: lateral bar with herbs cover; 4: cultivated floodplain;
 5: riparian shrubs and little trees; 6: trees; 7: mill and mill dam; 8: ruined mill dam; 9 railway;
 10: built up areas. Sources: Service Historique de la Défense, Google Earth.

Ecological changes are spectacular, due to the installation of many trees or shrubs forming an almost continuous line of riparian vegetation along Vardar river and on the island. Given these features and on the basis of similar changes observed in other rivers, it can be assumed that stream bed has lowered with respect to its altitude at the start of the 20th century. In watersheds, erosion is currently less active due to spontaneous vegetation recovery, reforestation programs and rural depopulation. Many dams were also built for energy production and irrigation in the second half of the 20th century [15]. As in many other similar cases, such as Durance river, in southern France [14], these factors can have greatly altered the natural regime and sediment transport and caused a fluvial metamorphosis. In some reaches, intensive gravel mining in stream bed can have increased alluvium shortage and the consecutive entrenchment. It is also necessary to take into account the possible effects of the end of agricultural or pastoral uses

along river banks. A decrease in biomass withdrawals for livestock food or domestic fuel facilitates riparian vegetation recovery and the start of ecological succession. Considering the interactions operating between the vegetation and the river beds [3], the formation of a riparian forest along the Vardar river, as much as the decrease of sedimentary transport, may have played a role in the fluvial change.

Analysis of satellite images available for the past 10 years shows that this watercourse maintains sometimes considerable lateral mobility and that the risk of erosion has not disappeared. This is undoubtedly an issue to be assessed in sections of the valley where, as in Gradsko, there are many modern farms and greenhouses. Nevertheless, some vestiges of past water uses remain, such as the mill dam, which has not yet been entirely destroyed and which is a legacy of the old relations between local society and the river.

CONCLUSION

Archives left by the First World War about Balkans campaign appear to be an interesting documentary source for working on Balkan environments. Although it is unfortunately not possible to collect large photographic series, due to losses of archives during the Second World War, documents are precise enough to allow measurements or quantitative approach of landforms or land-use. They can particularly give some useful historical milestones to assess environmental changes over the last century. We have presented only two

examples here, but this approach can also be applied to the agricultural landscape changes, to that of built-up areas or to cultural or natural heritage. These archives also open a window on regional landscapes before the major economic changes which occurred from the mid-20th century onwards and they could provide a valuable interpretive framework to improve our knowledge about modern and contemporary environments (from Ottoman to national independence period).

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