

# Recovery of Watermills in the Land of Hațeg (Romania) by Mapping Old Cartographic Materials

---

GHEORGHE-GAVRILĂ HOGNOGI, ANA-MARIA POP,  
DIANA-ELENA ALEXANDRU, GEORGE GAMAN

## Introduction

**A**FTER THE Industrial Revolution, together with the change in the perception of elements formerly considered appealing and necessary to be included in the category of cultural heritage, some of industrial sites became historical monuments themselves, thus outlining what was called “the aesthetics of industrialization” (Edwards and Llurdés 1996, 343).

On 17 July 2003, The International Committee for the Conservation of the Industrial Heritage (TICCIH) launched the Nizhny Tagil Charter for the Industrial Heritage, a recommendation for public authorities to promote the industrial sites for tourist purposes. Unlike rural tourism or agritourism, industrial tourism rarely includes accommodation or catering and it depends on the level of degradation of industrial sites; hence, the lack of attachment of the population to industrial sites, people usually associating them with hard working and living conditions. Thus, the image of some industrial sites rarely becomes a brand of the region. Textile heritage tourism is widely spread in Europe, valuing watermills and their ancillaries, one of the best examples of good practices being the city of Tilburg, Holland. While, at the beginning of the 19<sup>th</sup> century, it registered about 145 watermills, closed or demolished in the context of the European industrial decline, it currently promotes the local and European textile industry history by way of the Audax Textile Museum initiative (Lane et al. 2013, 52).

The reconversion of industrial and preindustrial monuments may take various forms, from singular elements of industrial tourism to the creation of scientific parks, all of them eventually becoming capitalized products (Garaca et al. 2014, 182; Cercleux et al. 2012, 217). They may reflect the needs of contemporary society, provide functionality to some urban spaces (Filip 2009, 44), or may even become individual tourist destinations, industrial tourism preserving their economic value and preventing their destruction (Merciu Iancu and Stoica 2010, 63; Boros, Martyin, and Pál 2013, 109). To reactivate the identity values (Gouthro and Palmer 2010, 3) and authenticity as the most important quality

(Alonso, O'Neill, and Kim 2010, 37), tourist routes can be also associated with the local gastronomy (Bessière 1998, 23), which may represent another form of using the traditional facilities. Changing the perception of local people on industrial landscapes may represent another way to integrate them as a tourist destination (Bărbuică 2012, 3).

The historical analysis of the preindustrial and industrial landscape starts with the interpretation of older cartographic materials overlapping the current maps (Canu 2006, 2; Frajer and Geletič 2011, 3; San-Antonio-Gómez, Velilla, and Manzano-Agugliaro 2014, 48), which become working tools for landscape reconstructions (Fuchs et al. 2015, 44), used in various land-use planning layouts.

We aimed to analyze the old and new cartographic materials in order to identify the traditional watermill facilities and the current traditional landscape in the Land of Hațeg. The paper is structured as follows: Section 1 includes highlights on the preindustrial and industrial heritage concepts in terms of landscape restoration in the national and international literature; Section 2 includes the description of the study area and the methodology used; Section 3 reveals the results of the analysis of the cartographic materials; Section 4 emphasizes the importance of preindustrial heritage at national level and the opportunity of turning to good account the traditional facilities in the Land of Hațeg, while Section 5 synthesizes the conclusions of this paper.

## The Preindustrial Heritage at International Level

**T**HE INDUSTRIAL revolution profoundly changed the face of Europe, industrial sites becoming an undeniable part of humanity's history. The material and immaterial components of the industrial heritage are part of each European state identity. However, their landscape value is unevenly acknowledged, directly depending on the economic trends. The first acknowledgement of the industrial inheritance came at the end of the 1950s, when Great Britain set up a protection regime for industrial buildings. In the next two decades, the northern countries (Germany, Sweden, Belgium, France, and Holland) started sharing the same vision. Over the last 30 years, the level of understanding and awareness regarding the importance of industrial elements and their conservation has increased, especially after the emergence of a new field of intervention, industrial archeology, which makes use of everything related to the industrial heritage (mills, factories, mines, channels, bridges, various technical facilities, etc.). To save them from abandonment or degradation, many of the sites built in the 18<sup>th</sup> and 19<sup>th</sup> centuries were included in the UNESCO list of historical monuments (33 in total, 28 of which are located in Europe), of which two sites are directly related to the location of some watermills (Derwent Valley Mills, Great Britain; Verla Groundwood and Board Mill, Finland), presently included in tourist routes.

In a report published on the inventory of watermills located in the USA, the US Environmental Protection Agency (2006) highlights the importance of their restoration in shaping the identity of cities.

Among the possible interventions in the case of industrial sites, the Parliamentary Assembly of the Council of Europe (2013) recommends the creation of a pan-European

partnership between the institutions with expertise in the field of industrial heritage (the European Federation of Associations of Industrial and Technical Heritage, the European Route of Industrial Heritage network–ERIH, Europa Nostra) through the permanent update of industrial sites of interest and the setting up of a catalogue of best practices or guidelines on the optimal way to value the industrial heritage.

## The National Preindustrial Heritage

**R**OMANIA IS ranked high among the countries with a rich technical heritage, connected to the main economic activities such as hydropower, mining, transport, textile or food industries, developed by the middle of the 18<sup>th</sup> century in Transylvania and Banat, and extended over the entire country during the second half of the 19<sup>th</sup> century. The general unfortunate state of the industrial heritage, particularly in the case of Romania, is mainly determined by the termination of industrial activities and privatization, when industrial facilities were assigned other uses (nonoperational in most of the cases), along with the dismantling of some facilities within the industrial sites, the change in ownership, or their transformation into spaces with a different purpose (residential, services).

The situation is even more uncertain if we refer to the preindustrial heritage, negatively affected by the lack of or the failure to implement legal protection measures, the lack of knowledge of the local communities, the disappearance of traditional elements in the rural areas, along with the permanent search for modern elements of comfort and the tendency to dispose of the native traditional elements. The national chronological inventory, achieved by Wollmann (2012), based on the archived documents, postcards, and old photographs, represents the first step in the Romanian documentation of watermills. The high number of identified watermills and other categories of technical monuments, together with the originality of the facilities, represent a solid argument in support of their use (*ibid.*, 8).

Even since 1961, the Historical Monuments Division within the State Committee for Architecture and Construction expressed their concerns about the conservation of industrial heritage on the Romanian territory, when they had to make a list of the historical monuments, and add a new category, that of the industrial architecture monuments. The initiatives of the Ministry of Culture and Church Affairs, the Division of Historical Monuments, the National Commission of Romania for UNESCO have also considered the issue of industrial heritage and included the related provisions in the national heritage conservation strategies. The legislative mechanisms used are represented by Law 422 of 18 July 2001 on the protection of historical monuments, Law 182/2004 on the protection of mobile cultural heritage, and Law no. 6 of 2008 on the legal regime of the technical and industrial heritage.

When trying to define landscapes, Cocean and David (2014) use several criteria, among which we mention the genetic, evolution, structural, operational, temporal, level of vulnerability and of attractiveness (*ibid.*, 38–41). Thus, if we consider the genetic typology and fit them into the category of cultural technogenous landscape, water-

mills are then integrated in the category of hydropower, wind power and solar facilities, which precede the industrialization phase. Watermills were built depending on the availability of water flows and Stoica and Schreiber (2008) distinguished three types of watermills in Romania, as follows: watermills on ponds, watermills on riverbanks, and floating watermills. Besides them, other items or facilities were considered part of the preindustrial heritage, such as: cloth mills, whirlpools, distilleries, oil mills, saw mills, smithies and pottery workshops (*ibid.*, 27–28).

Grinders were used in rural households for cereal processing and seed grinding. To improve their efficiency they were accompanied by more efficient water-, wind- or animal-powered devices, three categories of facilities being thus further developed: watermills, animal-powered mills, and wind mills. Considering only the hydraulic mills, we can also identify bucket watermills (in which case the vertical runner stone is set in motion by a simple wooden device), watermills with vertical wheels, widely distributed in the basins of Arieș River, Târnava Mare River, watermills with vertical wheels, located on the banks of larger rivers, with upper intake vertical wheels, which are specific to the Someș Valley, and floating watermills found along the Someș and Mureș Valleys (Wollmann 2012, 138). However, as a result of the changes occurred after 1989, Mirea (2012) identified three categories of industrial landscapes: deconstructed, abandoned or under reconversion, which can be also considered in the case of preindustrial facilities (*ibid.*, 5).

## Materials and Methods

### Study Area

**L**OCATED IN the southwestern part of Transylvania, in the West Development Region (NUTS2), overlapping Hunedoara County (Fig.1), the Land of Hațeg, represents one of the most complex regions of the Carpathian area. It is marginally polarized by the town of Hațeg and its area of influence covers the rural localities in the Depression of Hațeg and the entire rural area at the foothills of the Retezat and Șureanu Mountains (Hognogi and Văidean 2014, 3).

Together with the Pădureni District, the Land of Hațeg is part of the Local Action Group of the Land of Hațeg—Pădureni District Micro-region, an association founded under the LEADER program, and it includes 11 Territorial Administrative Units (TAU).

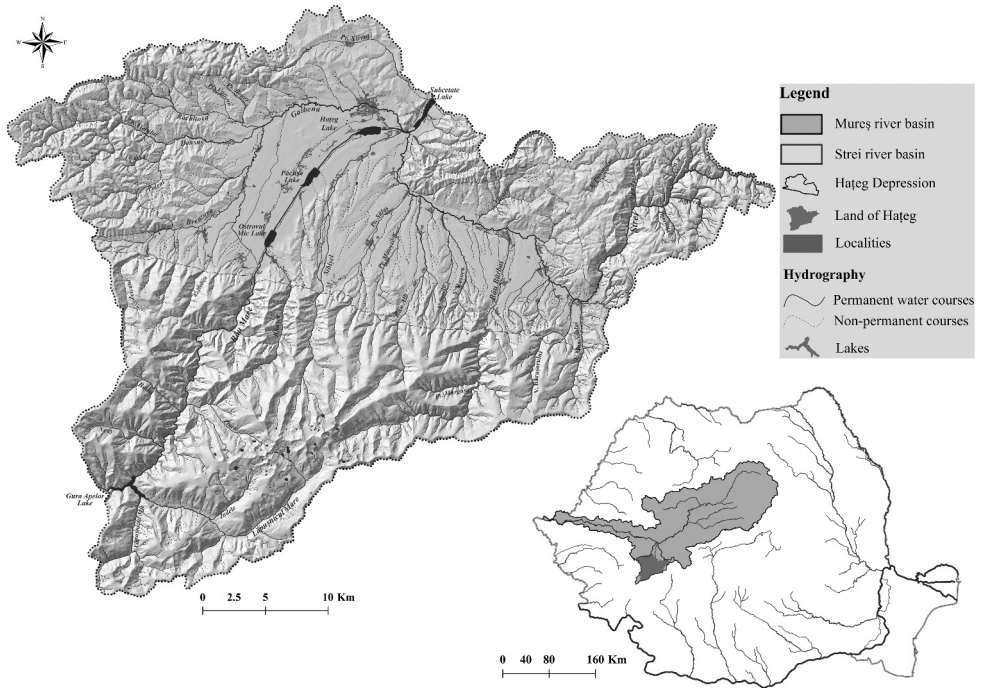
We selected three pilot areas: Sibișel Valley, Râului Alb Valley, and Râușor Valley. They are all located in the Depression of Hațeg, two of them located on 3<sup>rd</sup> degree water courses (Râu Alb, Râușor) and one of them on a 4<sup>th</sup> degree water course (Sibișel), the streams being left tributaries of the Strei River.

### Data Acquisition

METHODOLOGICALLY, WE used the “top-down” analysis, approaching the preindustrial heritage on 3 levels: nationally (Romania), regionally (The Land of Hațeg) and locally (Sibișel Valley, Râu Alb Valley, Râușor Valley).

The cartographic-related information (data, author, projection, coordinate system, purpose) is extremely important in the recovery of some historical data, but in many cases

FIG. 1. LOCATION OF THE STUDY AREA—THE LAND OF HĂȚEG



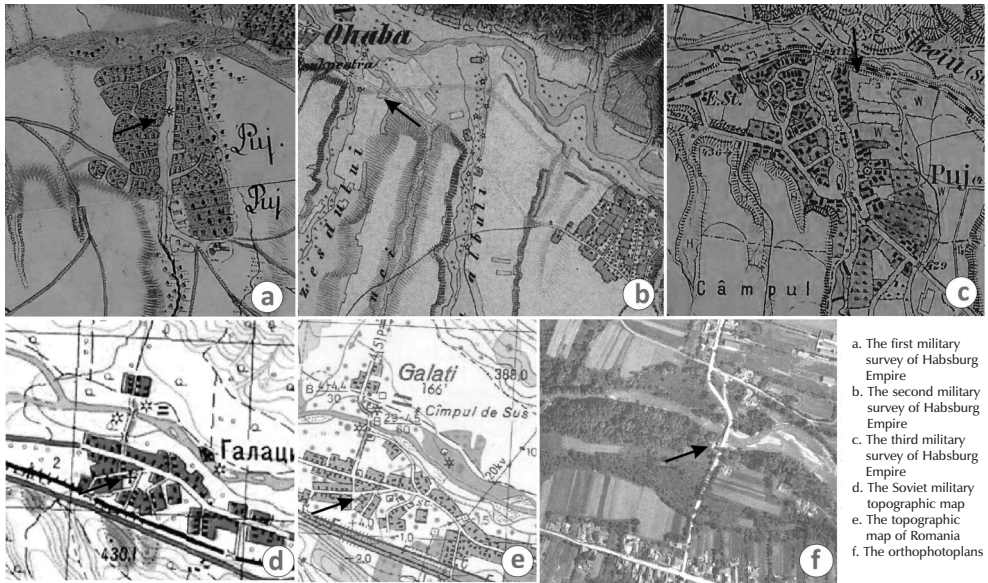
it proved to be unknown. We employed four historical maps, one general topographical map and more recent aerial photographs (see Table 1).

TABLE 1. THE CARTOGRAPHIC RESOURCES USED FOR THE IDENTIFICATION OF WATERMILLS IN THE LAND OF HĂȚEG

Analyzed period	Cartographic resources used	Results (number)
1769–1773	The first Habsburg topographic survey, scale 1:28,800	48 mills
1806–1869	The second Habsburg topographic survey, scale 1:25,000	112 mills
1869–1887	The third Habsburg topographic survey, scale 1:25,000	118 mills
1940	The Soviet military map, scale 1:50,000	17 mills
1978	The topographic map of Romania, scale 1:25,000	18 mills
2013	Orthophotos, scale 1:5,000	10 mills

The first topographic survey was conducted at the order of the Empress Maria Theresa for the purpose of systematically mapping the Austro-Hungarian Empire (see Fig. 2). The sheets referring to Transylvania were elevated for military reasons and also contained data on the number of settlements or certain economic details. Due to the limited time and low budget, the maps were drawn up without a geodesic basis (triangula-

FIG. 2. THE CARTOGRAPHIC RESOURCES USED



- a. The first military survey of Habsburg Empire
- b. The second military survey of Habsburg Empire
- c. The third military survey of Habsburg Empire
- d. The Soviet military topographic map
- e. The topographic map of Romania
- f. The orthophotoplans

tion). These were hand-made and the elevation was rendered by hatches, not by contour lines.

At the order of Emperor Francis I of Austria, the second topographical survey was performed, using the Cassini projection, this time for the entire territory of the empire, and it is considered to be the first representative mapping for the landscape evolution of the former empire. The third topographic survey was ordered by Emperor Franz Joseph I, and the map sheets were drawn so as to set the basis for a subsequent and more detailed 1:75,000 scale map (Frajer and Geletič 2011, 4). All related sheets of the three cartographic materials from the study area were prepared by consulting the Arcanum Adatbázis Kft. database. The Soviet military map and the topographic map of Romania were also employed for the diachronic identification of the watermills in the study area.

Due to the low quality of some map sheets of the first Habsburg topographic survey, we could only identify the watermills on the water courses of Strei, Izvoru, Râu-Bărbat, Râu Alb, Pârâul Măteștilor, Pârâul Sălaș, Pârâul Gârlete, Sibișel, Galbena, Poieni, Breazova, Hobița and Odorașnița rivers, without excluding the possibility of other watermills being present on the tributaries of the Galbena River (Densuș, Răchitova).

In this study, we used Arc Gis 10.1 and Corel Draw X7 software for mapping the materials, and we employed georeferenced orthophotographs of the administrative territories in the Land of Hațeg, with spatial coordinates rendered in STEREO 70 system, at 1:5,000 scale for the graphic and cartographic representations, whereas the photographs were taken by a DSLR (digital single-lens reflex camera), Nikon D5200.

To emphasize the role of the preindustrial heritage in Romania and show how important it is to value the still existing mills, we conducted the spatial analysis of mills at nation-

al level considering the List of Historical Monuments, a document issued in 2010 by the Ministry of Culture, acknowledging their value as historic monuments.

### **Data Processing**

By GEOREFERENCING maps in 1970 stereographic projection we aimed to reveal the evolution of watermills in the Land of Hațeg in time and space, thus proving their continuity. To reveal the current status of land use we chose to vectorize orthophotos (2013), on a scale of 1:5,000, and not process the data provided by Corine Land Cover (CLC), due to the low accuracy of the information achieved (i.e. fewer CLC classified categories of land that do not coincide with those registered on orthophotos, and low level of accuracy against the reality in the field) which makes the CLC database more suitable for the study of larger areas.

We identified the location of traditional facilities (mainly watermills) in the study area by analyzing the cartographic materials, and we validated the information by field research (mapping from orthophotos), conducted during July–August 2014.

After the historical reconstruction of these preindustrial heritage elements, 3 pilot areas were identified at local level, located on 3 water courses. We subsequently mapped the spatial correlations between these traditional facilities, the land use, and their tourist attractiveness.

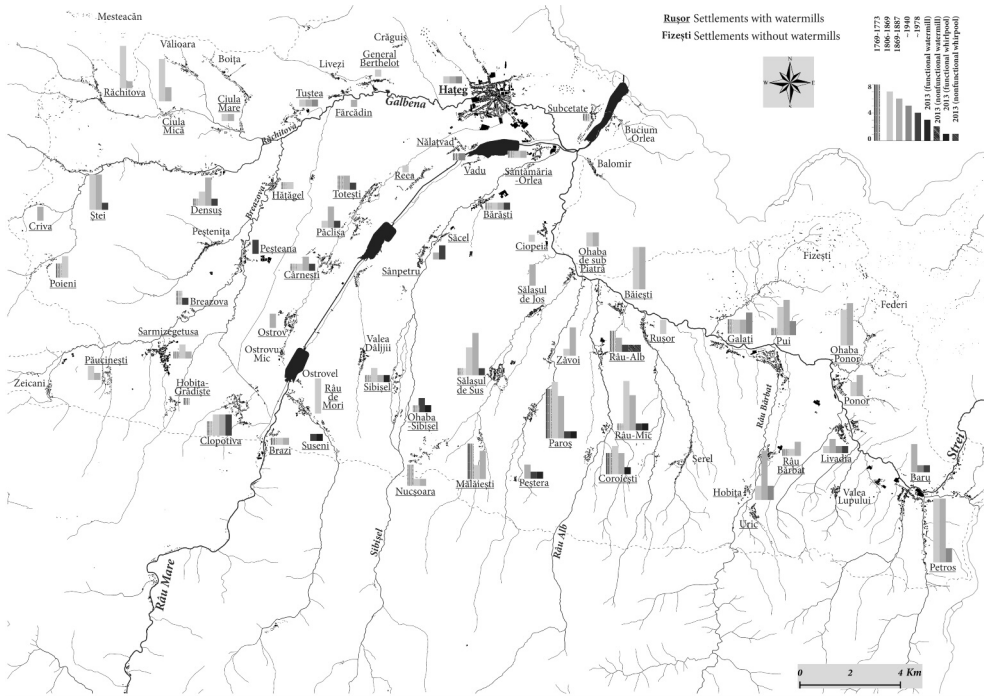
## **Results**

### **The Diachronic Evolution of the Traditional Watermill Facilities in the Land of Hațeg**

**T**RADITIONAL INDUSTRIAL facilities (watermills, whirlpools, plum brandy boilers, winepresses, old hemp carding machines, sawmills, etc.) emerged and developed in close relation to the old agricultural practices (the cultivation of cereals and textile plants). The oldest evidence of agricultural produce processing facilities in the Land of Hațeg dates back to the 16<sup>th</sup> century, as milling was considered a right of the feudal master. The situation became permanent throughout the following centuries, as proved by the land property conscriptions of 1785, which stated that peasants could practice milling if they paid certain taxes (Bara et al. 2012, 35).

The first data on the use of hydrographic resources during the medieval period (271–1600) is recorded late, in the 16<sup>th</sup> century, in various acts of donations of the kings of Hungary. As Lazăr and Tămaș (2003) stated, the use of watermills was one of the topics of these acts. According to the cartographic materials of the 18<sup>th</sup>–19<sup>th</sup> centuries and the recent orthophotos (2013) of the Land of Hațeg, traditional facilities present several particular situations (see figs. 3 and 4).

FIG. 3. TRADITIONAL FACILITIES IN THE LAND OF HAȚEG



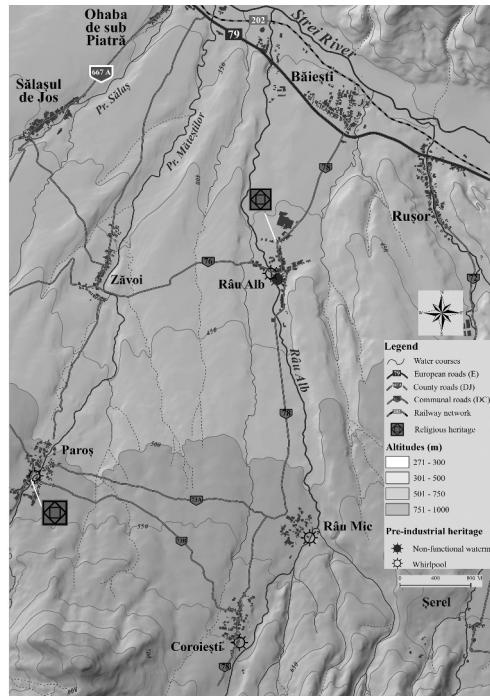
Starting with the 18<sup>th</sup> century, a high number of watermills is recorded (48), whereas the maximum number was recorded in the next century (118 watermills in the period of 1869–1887 and 112 watermills in the 1806–1869 interval). These values were directly determined by the increase of the crop yield, the low capacity of processing cereals, and the fluctuant flow of some streams in certain periods of the year. Villages with more than 5 watermills were quite numerous.

After the Great Union of 1918, the price for cereal milling was regulated by Order no. 20579 of 15.12.1920, the number of watermills in the Land of Hațeg being rather high in the villages, as follows: 15 watermills—Păucinești; 12 watermills—Zeicani; 11 watermills—Ostrov; 8 watermills—Grădiște (now Sarmizegetusa); 7 watermills—Ștei and Ohaba; 5 watermills—Peșteana, Hobița and Sibîșel; 3 watermills—Râu de Mori, Densuș, Hățăgel, Sânpetru, Poeni, and Săcel; 2 watermills—Unciuc, Suseni, Țuștea, Upper and Lower Fărcădin (now General Berthelot); 1 watermill—Gureni, Ostrovel, Bărăști, Sântămăria-Orlea, Valea Dâljii, and Breazova (Bara et al. 2012, 180).

During the socialist period, traditional facilities experienced a considerable setback. Most of the watermills' owners were considered "kulaks," many of them being forced to give up milling. In 1941, the praetorship of Hunedoara county had 911 village watermills and 2 systematic mills, of which 105 watermills were located in the praetorship of Sarmizegetusa district (RO: "plasa," small administrative territorial category/unit in



FIG. 4. THE FIRST PILOT AREA (RÂU ALB VALLEY)



interwar Romania), 69 watermills in the praetorship of Pui district and 65 watermills in the praetorship of Hațeg district (Bara et al. 2012, 184). When comparing the data shown by the Soviet military topographic maps with data recorded in the documents of that time, we note a significant difference regarding the real number of watermills, which mainly results from the considerable decrease in the number of watermills, and less from the scale used in mapping (1:50,000), the evolution of the settlements or the type of information mapped by the USSR.

Most of the watermills are found on the 3<sup>rd</sup> rank water courses, which are low flow watercourses. After analyzing all cartographic materials, we can conclude that watermills show continuity in the area under study (there are watermills mentioned in two cartographic sources—since 1769 until 1887, in three cartographic sources—since 1869 until 1978, and in 4 cartographic sources—since 1806 until 1978). Currently, there are only 10 watermills in the study area (on the following streams: Strei, Muncel, Rușor, Șerel, Râu Alb, Râu Mare, Râușor, Sibișel), most of them inoperable.

In order to piece together these elements of the cultural landscape we used cartographic materials dating back to the 18<sup>th</sup>–19<sup>th</sup> centuries, the older the cartographic resources the higher the accuracy of mapping the data.

### The Current State of Preindustrial Heritage at Local Level

TO OUTLINE the landscape interrelations at local level, we selected 3 pilot areas, considered representative for the Land of Hațeg—Râu Alb, Râu Mare and Sibișel—located in the Depression of Hațeg. We revealed the present state of these traditional facilities by relating to the territorial context (land use, accessibility degree of the area, and level of tourist attractiveness).

In the case of Râu Alb river valley, the first pilot area in the Land of Hațeg, the Habsburg maps showed at most 19 watermills. Nowadays, based on the 2013 orthophotos and our own field work, the following situation was identified: 1 inoperative watermill within the built-up area of Râu Alb locality and 2 whirlpools (1 of which operational) in the administrative territory of the Coroiești and Râu Mic localities. Located in a depression area, as the other 2 pilot areas, the area in the immediate vicinity of the traditional facilities is occupied by arable lands and grasslands, which certifies the dependence of the watermills on a certain type of agricultural crops (cereals, hemp). We also note the location of the watermills along some local roads (DC 78, DC 76) (see Fig. 4) which was meant to facilitate the trade in produce. The presence of the 2 whirlpools is conditioned by their relevance and use for carpet washing. These two preindustrial heritage elements, together with the traditional households, detritus (a wall built of granite without mortar) represent identity milestones of the local communities and their restoration could revitalize the area, currently affected by depopulation and demographic aging.

On the Râușor River valley, a tributary of the Râu Mare River, the field work and the analysis of the orthophotos resulted in the identification of only 1 non-operational watermill and 1 whirlpool within the built-up area of the Suseni locality, whereas the maximum number of traditional facilities mentioned on the maps between 1869 and 1887 was of 10 watermills (see Fig. 5). Another proof of their existence is represented by the watermill with two horizontal wheels and transmission gear, from Râu de Mori, located today within the ASTRA National Museum Complex in Sibiu. The 2 watermill facilities are located on the county road DJ 686, in an area with extensive agricultural crops, but also in the proximity of some tourist facilities of national importance (The Court of Cândești, the Colț Fortress, the church of the Cândea family). Therefore, in the context of valorizing the existing preindustrial and traditional landscape (popular traditional architecture, detritus), the historic monuments of national interest located in the area will also be considered.

Although during the Austro-Hungarian Empire the cartographic documents of the time indicated 6 watermills, in the third pilot area, the Sibișel Valley, there are currently 2 watermills (1 of which operational and also being mentioned on an tourist informative board) and 1 whirlpool in the Sibișel locality (see Fig. 6). At the same time, there are two other watermill facilities preserved within the ASTRA National Museum Complex in Sibiu. They used to be located in Ohaba-Sibișel locality and were specifically used for processing oilseeds, and they functioned based on local resources (river stone). Their degradation occurred under in the context of depopulation and of the replacement of the native elements with modern technologies.

FIG. 5. THE SECOND PILOT AREA  
(RÂU MARE VALLEY)

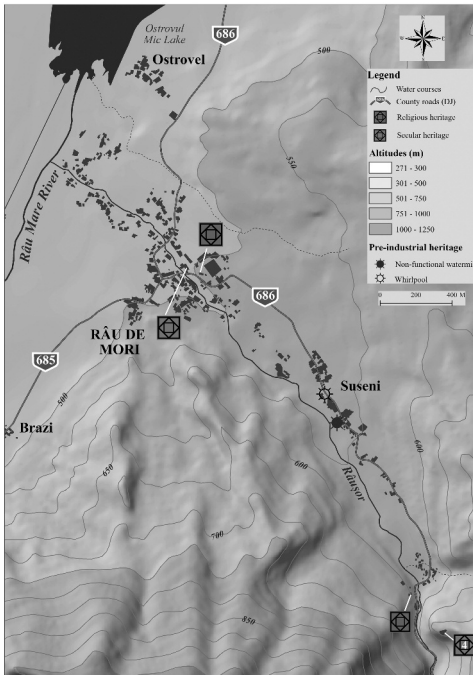
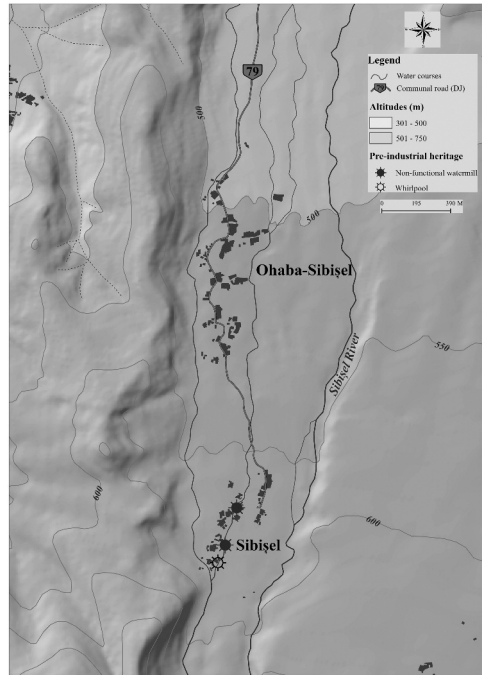


FIG. 6. THE THIRD PILOT AREA  
(SIBIȘEL VALLEY)



## Discussion

**W**E PROPOSE several recommendations to valorize the preindustrial heritage in the Land of Hațeg for the benefit of the local community as direct beneficiary.

a) Preventive conservation measures are necessary for the still existing traditional water-mill facilities (in situ conservation and the functional rehabilitation for operational purposes).

b) To increase the added value some specific measures should be considered, such as: i. develop some related traditional activities (cultivation of hemp and sunflower); ii. set up small industrial processing plants (for the production of hemp oil, different size customized wrapping packages, containers and bags); iii. stimulate the setting up of local specific start-ups (trout farms, restaurants serving local food); iv. reinforce connections with the existing food networks (Association of Farmers in Sântămăria-Orlea) for the best valorization of food products.

c) Applying for the inclusion of the existing preindustrial heritage in some national and regional thematic routes or even in the European Route of Industrial Heritage, which is a network developed as a result of an Interreg project, promoting some industrial-type tourist sites.

d) Functional rehabilitation of mills in support of local pastry production. National certification and sale of traditional products.

e) Creation of a millers' registry. The rehabilitation of the existing whirlpools could boost the local textile industry, particularly since traditional weaving and sewing workshops are occasionally organized in the area, mainly in Nucșoara village.

## Conclusions

THE SPATIAL reconstruction of some geographic features by interpreting old cartographic materials makes us understand certain phenomena and may provide insights concerning the further development of the area under study. This multitude of preindustrial and industrial heritage sites in Romania could be considered for the alternative territorial development, if not through a return to the original functioning purpose, then at least by designating them as tourist attractions. Traditional facilities, be them watermills, windmills or other types of mills (manually operated), are currently representative elements for the material and spiritual culture and identity of a place. However, the reluctance of local residents towards industrial sites, as former employees, or due to their desire to have a different and higher level of comfort, and the low interest of decision-makers inhibit the development prospects.

Another challenge is the lack of preventive conservation measures. Instead of being conserved in situ, where their functional, aesthetic and tourist features could be turned to good account, traditional facilities are preserved mostly as exhibits in museums and other ethnographical institutions.



## References

- Alonso, Abel Duarte, Martin A. O'Neill, and Kyungmi Kim. 2010. "In search of authenticity: a case examination of the transformation of Alabama's Langdale Cotton Mill into an industrial heritage tourism attraction." *Journal of Heritage Tourism* 5, 1: 33–48. DOI: 10.1080/17438730903469821.
- Bara, Ioan Sebastian, Marcela Balazs, Florin Dobrei, Vasile Ionaș, Ioachim Lazăr, Liviu Lazăr, Paulina Popa, and Denisa Toma. 2012. *Județul Hunedoara: Monografie*. Vol. 4. Deva: Emia.
- Bărbuică, Letiția. 2012. "Performativitatea spațiului public: Strategii legate de patrimoniul industrial." *Urbanism. Arhitectură. Construcții* (Bucharest) 3, 4: 39–44.
- Bessière, Jacinthe. 1998. "Local Development and Heritage: Traditional Food and Cuisine as Tourist Attractions in Rural Areas." *Sociologia Ruralis* 38, 1: 21–34.
- Boros, Lajos, Zita Martyn, and Viktor Pál. 2013. "Industrial tourism—trends and opportunities." *Forum geografic: Studii și cercetări de geografie și protecția mediului* (Craiova) 12, 1: 108–114. DOI: 10.5775/fg.2067-4635.2013.132.i.
- Canu, Benoît. 2006. "Les Moulins du Clos du Cotentin: contribution à l'étude d'un facteur et indicateur de l'évolution du territoire et de ses contingences naturelles et anthropiques." *In Situ: Revue des patrimoines* 7: 1–18. DOI: 10.4000/insitu.2578.

- Cercloux, Andreea-Loreta, Florentina-Cristina Merciu, and George-Laurențiu Merciu. 2012. "Models of technical and industrial heritage re-use in Romania." *Procedia Environmental Sciences* 14: 216–225.
- Cocean, Pompei, and Nicoleta David. 2014. *Peisaje culturale*. Cluj-Napoca: Risoprint.
- Edwards, Arwel J. and Joan Carles Llurdés, 1996. "Mines and quarries: Industrial heritage tourism." *Annals of Tourism Research* 23, 2: 341–363.
- Filip, Sorin. 2009. "Functional Reintegration of Brownfield Lands at Regional and Local Level. Case Study: Maramureș-Chioar Region." *Romanian Review of Regional Studies* 5, 2: 43–50.
- Frajer, Jindřich and Jan Geletič. 2011. "Research of Historical Landscape by Using Old Maps with Focus to its Positional Accuracy." *Dela* (Ljubljana) 36: 49–67. DOI: 10.4312/dela.36.3.49-67.
- Fuchs, Richard, Peter H. Verburg, Jan G. P. W. Clevers, and Martin Herold. 2015. "The potential of old maps and encyclopaedias for reconstructing historic European land cover/use change." *Applied Geography* 59: 43–55. DOI: 10.1016/j.apgeog.2015.02.013.
- Garaca, Vuk, Aleksandra Trifkovic, Nevena Curcic, and Svetlana Vukosav. 2014. "Aspects of Industrial Heritage Tourism: Case of Novi Sad." *Revista de cercetare și intervenție socială* 44: 181–198.
- Gouthro, Mary Beth and Catherine Palmer. 2011. "Pilgrimage in heritage tourism: finding meaning and identity in industrial past." In *Mining Heritage and Tourism: A global synthesis*, eds. Michael V. Conlin and Lee Jolliffe, 33–43. London–New York: Routledge.
- Hognogi, Gh. and Roxana Văidean. 2014. "Relevant Hydrology Elements in Terms of Regional Geography Analysis. Case Study: The Land of Hațeg." *Studia UBB: Geographia* 59, 2: 87–98.
- Iancu (Merciu), Florentina-Cristina and Ilinca-Valentina Stoica. 2010. "Tourist Capitalization of Industrial Heritage Elements: A Strategic Direction of Sustainable Development. Case Study: The Petroșani Depression." *GeoJournal of Tourism and Geosites* 3, 5/1: 62–70.
- Lane, Bernard, Richard Weston, Nick Davies, Elisabeth Kastenholz, Joana Lima, and Janusz Majewski. 2013. *Industrial Heritage and Agri/Rural Tourism in Europe: A review of their development, socio-economic systems and future policy issues: Study*. European Parliament, Directorate-General for Internal Policies, Policy Department B: Structural and Cohesion Policies, Transport and Tourism, Brussels, European Union.
- Lazăr, Ioachim and Ion-Pilu Tămaș. 2003. *Monografia comunei Baru Mare*. Deva: Emia.
- Mîrea, Delia Adriana. 2012. "Metode de evaluare a efectelor reconversiei peisajului industrial în starea mediului municipiului București." Ph.D. thesis, Bucharest University, Faculty of Geography.
- San-Antonio-Gómez, Carlos, Cristina Velilla and Francisco Manzano-Agugliaro. 2014. "Urban and landscape changes through historical maps: The Real Sitio of Aranjuez (1775–2005), a case study." *Computers, Environment and Urban Systems* 44: 47–58. DOI: 10.1016/j.compen-urbnsys.2013.12.001.
- Stoica, Flavia and Wilfried Schreiber. Eds. 2008. *Peisaje culturale istorice*. Cluj-Napoca: Argonaut.
- Wollmann, Volker. 2012. *Patrimoniul preindustrial și industrial în România*. Vol. 3. Sibiu: Honterus.

### **Abstract**

#### **Recovery of Watermills in the Land of Hațeg (Romania) by Mapping Old Cartographic Materials**

The purpose of this paper is to analyze some old cartographic materials overlapping recent orthophotos in order to identify the watermills in the Land of Hațeg (Romania) and individualize the current traditional landscape. The watermills located in the middle and upper basins of the Strei River, in the Land of Hațeg, have experienced a significant evolution in time and space. However, the presence of watermills can be traced back to the second half of the 18<sup>th</sup> century, when the first cartographic documents were issued. The methodological approach included one “top-down” analysis, the historical reconstruction of the preindustrial heritage sites, and a spatial analysis of the most relevant tourist resources. Findings prove the continuing presence of watermills in the territory under study, albeit poorly managed.

### **Keywords**

vernacular elements, hydraulic equipment, Land of Hațeg, preservation, landscape restoration