

## Medicinal tourism in Hungary Oasis-farm

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### Abstract

Hungary is located in the central part of Europe, in a basin surrounded by the Carpathian Mountains. During Pliocene this basin was covered by the so-called Pannonian Sea which reached its maximum extent in this period. The 3-4000 meter thick sedimentary sequence deposited in this time facilitated the formation of thermal-waters in which Hungary became considerably rich. This paper is aimed at presenting this wonderful natural resource. Scientific investigations conducted so far provided fundamental knowledge on it. Our objective is the most costeffective utilization of these waters – natural sources or driven wells – ascending to the surface. The opportunities are diverse. In the Oasis-farm we try to demonstrate its aspect associated with medicinal tourism considered as a new, original proposal. The complex use of thermal-waters (integrated multipurpose thermal-water system) seems to be a successful solution. In order to demonstrate our concept we selected a region in the central part of the country covered by dry and poor soil but rich in thermal-waters. The description of geographical, geological and geothermal settings, the brief account on the historical development of spa-culture and the presentation of the geographical values of Hungary as well as its potential in the given subject provide the background necessary to understand the article. In some of the following paragraphs we draw up the conceptual structure of the Oasis-farm, the “circulation” of thermal water within the farm, the technical solutions, and the “centre” concept of the farm as well as the related establishments (spa-hotels), sports and recreation facilities and different bathing-pools, etc. of the complex. The so-called “circle round the moon” is also addressed together with the small boarding houses, farms for horse-riding, etc. These latter reinforce the centre character of the Oasis-farm, since the all year round operation of the farm can give a new impulse to its continuous attendance.

**Keywords:** *balneotherapeutic hospital, thermal-water, recreational "oasis" establishments.*

## 1 Geographical, geological and geothermal background

Hungary is located in the central part of the Carpathian Basin, its flat plains are dotted by rolling hills, block-mountains and areas of past volcanic activity. Being surrounded by the Carpathian Mountains the country's surface has a basin-like character. The basin of the Pannonian Sea, reaching its biggest extent in the Pliocene, had sunk whereas its edges had risen. These geohistoric events are indicated by a 3-4000 meter thick diversified sedimentary sequence deposited in the Pannonian Sea. The mineral- and thermal-waters utilized nowadays originate from the upper 500-2000 meter thick buried sedimentary complex. The miscellaneous types of waters have different medicinal properties and are useful for preventive treatment and recovery from illness of 9 different types as well as providing recreation and relaxation.

## 2 Historical development and spa-culture

The usefulness of thermal-waters for medical treatment was discovered by the Celts 4000 years ago. The Romans used them for recreation and recovery and the Turks developed spas in the 16<sup>th</sup> and 17<sup>th</sup> centuries. The baths built by the Turks (Rudas, Rác, Király, Lukács, Eger) are still in use today and are famous all over the world.

The spa-culture had developed further in the following centuries: Hévíz 1785, Harkány 1824, Margitsziget 1867, Városliget 1878. Famous spas, such as Hajdúszoboszló, Bükfürdő, Balf, Debrecen, Gyula, Zalakaros etc., were built in a recent wave of balneological interest.

According to a survey made in 2000, there are 1289 known thermal springs in Hungary with temperatures between 30-100°C; the number of thermal-baths is 243, which are located in 50 settlements.

### 3 Geographical values of Hungary

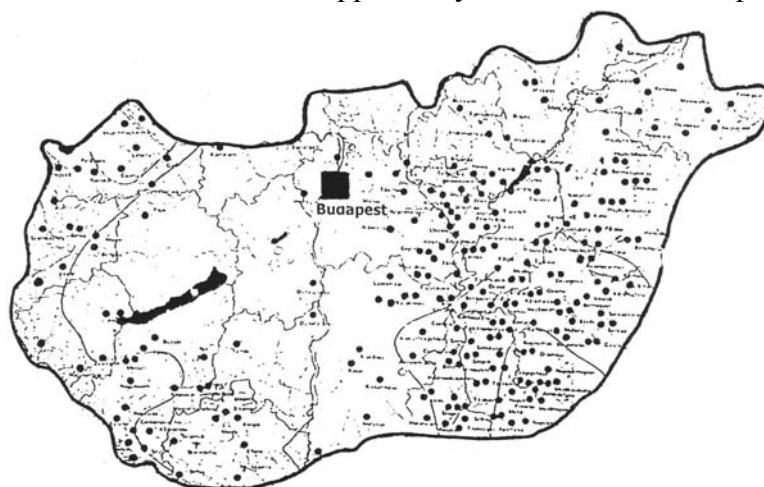
Beyond the thermal-waters Hungary has several other values for the benefit of visitors, such as its location, climate, diversified topology, varied agricultural regions and the influence of ample sunshine (2000-2200 hours) on the quality of agricultural products. These factors all together promote both domestic and international medicinal tourism. Furthermore there are several contemporary sights, the archeological findings of earlier millennia, the still existing monuments, excavation findings, traditions, the heritances of thousand of years old culture.

### 4 Perspective

In Hungary the geothermal gradient is very advantageous for geothermal activity. While the continental average is 33 meters per °C, it is 16-22 meters in this country. Considering the rise in temperature: in 1000 meters depth the world average is 30-35°C, whereas the domestic one is 60-70°C. The highest values are obtained by the drillings in the Great Hungarian Plain (Alföld). It has also to be noted that geothermal energy (earth-heat) is a form of environmentally friendly and renewable energy as compared to fossil energies (coal, oil, natural gas).

The given opportunities, the word ranking thermal-water reserves (e.g. heat capacity of our dynamic thermal-water reserve is equivalent to about 1,5 million tons of oil per year) are fortunate fundamentals on which we can plan for longer periods – as earlier mentioned, since earth-heat renews itself and it is renewable on the scale of human existence.

The idea of OASIS-FARM was promoted at the beginning of the “nineties”. Two-thirds of the surface of our country is underlain by a thermal-lake. As indicated on Figure 1, wells can be located almost all over the country. More than 3000 deep wells have been completed so far (hydrocarbon drillings), and these, mostly closed wells are suitable – in case of need and opportunity – for thermal-water production.



Map 1: Significant thermal-springs.

In Hungary many medicinal hotels and medical thermal-baths operate, but there are “blank spots” in many places with all the necessary resources available like the Alföld, where new establishments are missing. We wish to set up the OASIS on these areas.

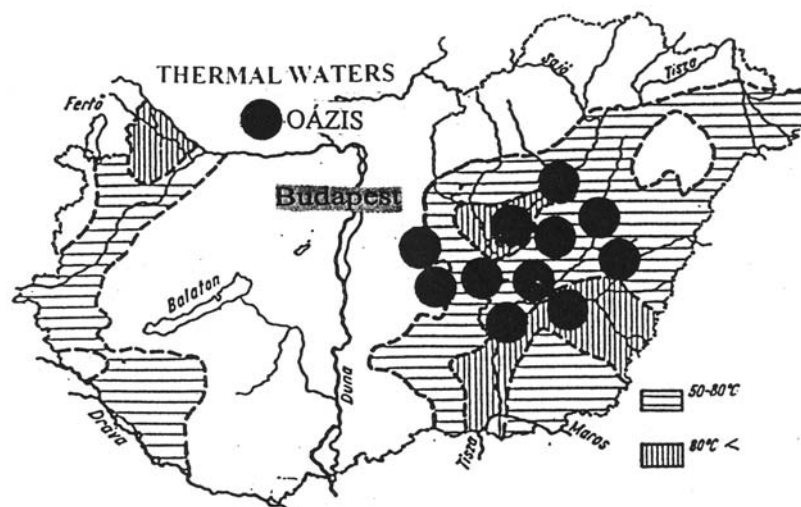


Figure 2: Thermal-waters (oasis).

#### 4.1 Some comments on the construction of OASIS-FARMS

The OASIS-FARM is a new kind of tourist-, convalescent holiday-, therapeutic-, entertaining establishments, planned to be on thermal-springs. This new facility is to be a spectacular, independent bioestate with the objective of multiple integrated use of the water of geothermal springs – like thermal-water supply of medical institutions, heating of buildings and green-houses, acquisition of medical – mud by sedimentation, etc. The “OF” projects are planned to be completed on dry grounds in the central part of the Plain, in areas of low productivity (e.g. in the vicinity of Kécskémét–Hérvécia). The “OF”-s – depending on their individual thermal-water composition – would be different economic units each with their own unique set of characteristics in therapy, tourism and recreation. The intended sites in the above-mentioned region are the driest areas in the country (precipitation 450-500 mm per year, 200-250 mm between April–Sept.), where the main temperature between April–September is 18°C and 75% of the 2000-2200 hours of early sunshine occurs during these months. Warm climate with dry, hot summers and droughts is perfect for summer vacationing and bathing.

### 5 “Circulation” of thermal-water at the “OF” project

The complex use of thermal- and medical-waters at Oasis-Farm (integrated multipurpose thermal-water system) connects the entire path of circulation of thermal-water produced by the wells. Further on we outline its key methods and technics based on the Hérvécia Project. We have to point out that our aim in designing this complex system is to utilize the thermal capacity of the thermal-water with as small a heat-loss as possible.

At the beginning of the process the 60-70°C warm thermal-water is carried from springs to bio growing green-houses through fitting pipelines (closed system free from pollution), then on to bio stock-raising buildings (closed system), where – according to earlier calculations – the water cools down to 30-38°C degrees suitable for bathing; this water then supplies the open-air pools and those inside the hotel. Another spring – with the required higher temperature – supplies heat for hotel-rooms

and medical-buildings and provides steam baths, hot-water basins needing a higher temperature etc. Thermal- (medical-) waters – after the previously outlined usage – uniformly flow into settling ponds, which are working gravitationally, with strainers. These filter beds arranged in tiers ensure the utilization of grains with different size.

The No. 1. settler catches the rough-grained mud (medical mud).

The No. 2. settler catches the fine-grained one (raw material for ointments, materials for curative massage and cosmetics).

The No. 3. settler is a natural pond (fishing pond) which stores the cooled-down, lukewarm, nature-protective water and carries it continuously in a controlled manner to a drainage system (overground streams), to bio-horticulture facilities or to the ponds and creeks of golf-course with lower exposure. The complex usage is cost-effective, preserves the environment and fits to natural circulation.

Recent target-surveys prove that thermal-waters utilized as described above, cause relevant pollution in surface waters and in the soil.

Accordingly, the sand ridge waters, utilized by Oasis complex system, don't need recuperation. It solved a problem hotly discussed in Hungary. The latest experimental measurements reinforce namely that thermal-waters, after this utilization, cause only insignificant local pollution in surface – or groundwater – that can be considered negligible. Moreover the ratio of detritic, porous (mainly Upper Pannonian) sandstone is 87% in Hungary. In this kind of aquifers –there is not any operative recuperation according to international experience.

## **6 Other available facilities and possibilities**

Apart from its medical-services described above, the OASIS-FARM – in this case Helvécia, provides a wide range of services through the complex use of thermal-water: bioproducts of its own raising (plants, animals); horse-tours, hunting in nearby forests, pleasure rides, medical-horse riding, water fun-fair; promenades and educational-trails in the planned parkforest, post-glacial native plants in its gardens, professional lectures on the plants, organized excursions, bicycle tours, sporting establishments such as tennis-courts, golf-course, indoor sports hall, indoor swimming pool, racing pool, sporting events and many other, already existing entertainment facilities in the Farm theatre, in the small pensions and in roadside inns. The neighbourhood is a perfect pleasure ground with excellent specialities of Hungarian cuisine.

## **7 Summary of the types of geothermal fluids available in the region**

Table 1 (at the end of the paper) presents the most important and most characteristic mineral- and thermal-waters of Hungary, which are suitable both for medical treatment, bathing and for drinking cure. Map 1 outlines the regional distribution of the more than 3000 sources and driven wells. The richness of the Great Hungarian Plain in thermal-water is clearly manifested.

Table 2 (at the end of the paper) provides additional data on the oasis area represented on Map 2 concerning the composition of the water of non-active (closed) wells and those to be penetrated later all in the surroundings of operating thermal-springs (medical spas). Both tables offer thus an overview on the water types and therapeutical opportunities. The first table provides a countrywide picture, whereas the second one presents operating spas in the Great Hungarian Plain as well as the potential of wells in the planned oasis farm.

Waters of alkaline-bicarbonate content: this kind of water occurs in the Szappanszék lake, at Nagyszénás, Szolnok, Abony, Gyopárosfürdő and Kalocsa.

Waters of sulphate content: these waters spring forth of the three wells of Jászkarajenő and Tiszajenő.

Waters of iodine-bromine content: they can be observed at Cserkeszölő, Karcag (two springs), Szolnok, Túrkeve, Cegléd, Tiszaföldvár and Kiskőrös.

Waters of alkaline-bicarbonate and sodium-chloride content: they occur in the Szappanszék lake at Fülöpháza.

## 8 The role and future of the CENTRE

OASIS-FARM of HELVÉCIA – medical hotel, curative resort, spa, entertaining centre. I presented Helvécia (Helvetia) as the prototype of oasis-farm projects in order to introduce the original idea of the complex utilization of thermal-waters (integrated multipurpose thermal-water system). In this frame I described the system of a so-called oasis-resort, sanatorium and entertaining facilities that can serve as an example for setting up further oasis-resorts. They would be different from the prototype in the aspect of the relevant thermal-water compound that will define the scope of related medical activities.

The “Centre” – represented on the layout map of the project – becomes virtually the centre of the complex due to its central position and its establishments. The row of hotels ensures not only rest and entertainment, but several facilities are suitable for cultural programs (concerts, film premières) and meetings, business negotiations.

### Accommodation in the planned OASIS-FARM (4<sup>th</sup> or 3<sup>rd</sup> class)

Spa-hotels	4 individual hotels	
200 rooms	about	600 lodgings
20 apartments	about	100 lodgings
Camping	about	500 lodgings
Pensions (still existing)	about	300 lodgings
Total:	about	1500 lodgings

In the buildings there are meeting-rooms (50-100 seats) and club-rooms. The consulting-rooms from medical- and natural-treatments, for fitness and wellness are located in the same buildings. The assortment of recreation and games (bowling etc.), conditioning, salt-cave, subaqueous traction bath and pelotherapy can be found in the underground rooms. The sporting establishments give opportunity for non-stop running, also during the winter-season.

On one side of the inner thermal swimming pool the following facilities will be established: small basin with different size and temperature, a tropical indoor basin; on its other side: steam bath, dry steam, adventure bath, bubble bath, sauna, solarium, cosmetics and snack-bar.

In the park thermal-water and cold-water basins – in the aquatic fun fair several children’s bath would be set up.

Some hundred meters away from the Farm there is an already functioning three-storey hotel (elder people’s home). This institution has pension with thermal-heating, indoor thermal-pool, library etc. Its active thermal-well supplies water with high mineral content and low hardness, including alkaline-bicarbonate, sodium chloride, iodine and fluoride.

To establish these OASIS-FARMS we are looking also for foreign investors to turn our thermal-water treasure to international advantage. Building upon the plans described above, Hungary has- in our view – the opportunity to become the medical- and resort-centre of the European Union.

## 9 References

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**Table 1: Major mineral and thermal-waters.**

Serial number	Waters	Cation	Anion	Salt	Site of important spring
1.	Waters of alkaline bicarbonate content	Na <sup>+</sup> (natrium)	HCO <sub>3</sub> <sup>-</sup> (hidrokarbonát)	NaHCO <sub>3</sub> (nátrium-hidrokarbonát)	Bükkszék ( <i>Salvus</i> ) Parád ( <i>Csevice</i> ) Balf, Bikkszád
2.	Waters of Ca-Mg bicarbonate content	Ca <sup>2+</sup> (kalcium) Mg <sup>2+</sup> (magnézium)	HCO <sub>3</sub> <sup>-</sup> (hidrokarbonát)		Budapest ( <i>Hungária</i> ) Moha ( <i>Mohai Ágnes</i> ) Parád ( <i>Szent István</i> )
3.	Waters of Glauber('s) Salt natronsulphate content	Na <sup>+</sup> (natrium)	So <sub>4</sub> <sup>2-</sup> (szulfát)	Na <sub>2</sub> SO <sub>4</sub> (nátrium-szulfát)	Jászkarajenő ( <i>Mira</i> )
4.	Waters of sulphate content	Mg <sup>2+</sup> (magnézium)	So <sub>4</sub> <sup>2-</sup> (szulfát)	MgSO <sub>4</sub> (magnézium szulfát)	Buda ( <i>Hunyadi János, Apenta, Igmæandi, Ferenc József, Mira</i> )
5.	Waters of sodium content	Na <sup>+</sup> (natrium)	Cl <sup>-</sup> (klorid)	NaCl (nátrium-klorid)	Kolop (Máriakút)
6.	Waters of iodine (bromine) content	Na <sup>+</sup> (natrium)	Cl <sup>-</sup> (klorid) J <sup>-</sup> (jodid)	NaCl (nátrium-klorid) NaJ (nátrium-jodid)	Sóshartyán, ( <i>Jodaqua</i> ) Debrecen, Hajdúszoboszló, Pesterzsébet Eger ( <i>Dobó-forrás</i> )
7.	Waters of iron content	Fe <sup>2+</sup> (vas)	HCO <sub>3</sub> <sup>-</sup> (hidrogén karbonát) SO <sub>4</sub> <sup>2-</sup> (szulfát)		Parád ( <i>Csevice</i> ) Görömbölytapolca; Sikonda, Csopak
8.	Waters of arsen content	As <sup>3+</sup> (arzén)			Parád
9.	Carbonic acid waters	H <sup>+</sup> (hidrogén)	CO <sub>3</sub> <sup>2-</sup> (karbonát)		Szeged ( <i>Anna-forrás</i> ), County of Borsod, Fonyód, Harkány
10.	Waters of sulfuric content	H <sup>+</sup> (hidrogén)	S <sup>2-</sup> (szulfid) CO <sub>3</sub> <sup>2-</sup> (tiokarbonát)		Parád ( <i>Csevice</i> ) Harkány, Budapest ( <i>Lukács, Margitszigeti, Széchenyi</i> ), Balf
11.	Waters with radioactive substance				Budapest ( <i>Rudas, Juventus-forrás</i> ) Hajdúszoboszló, Hévíz, river bed of Maros (radioactive mud)

**Table 2: Thermal- and medicinal baths.****Thermal baths**

town	name and address of the bath	opening hours	type of water	effects
Jászapáti	Open-air Bath	1 May – 15 September	plain thermal water	rheumatic problems
Jászárokszállás	Thermal and Open-air Bath	1 May – 31 August	plain thermal water	post-traumatic therapy, rheumatic problems
Jászberény	Thermal and Open-air Bath	thermal bath: throughout the year, open air bath: 1 May – 31 August	thermal water with alcali hydrogen carbonate	paralysis, locomotor diseases, bone and joint diseases
	Open-air Bath	1 June – 31 August	plain thermal water	rheumatic problems
Jászboldogháza	Open-air Bath	1 June – 31 August	plain thermal water	locomotor diseases
Jászszentandrás	Open-air Bath	1 May – 30 September	thermal water with iron	rheumatic and gynaecological diseases
Karcag	Open-air Bath	1 May – 30 September	thermal water with high salt content, hydrogen carbonate, calcium	locomotor, gynaecological diseases, disorders of the spine
Kisújszállás	Open-air Bath	1 June – 31 August	thermal water with alcali hydrogen carb. and iodine	exophthalmic goitre, hyperacidity
Kunhegyes	Open-air Bath	1 May – 30 September	thermal water with iodine	
Martfű		Open-air Bath	1 June – 31 August alcali hydrogen carbonate	mineral water with
Mezőtúr	Open-air Bath	swimming-pool: throughout the year open-air bath: 1 May – 31 August	thermal water with high salt content, alcali hydrogen carbonate, iodine and fluor	rheumatism, problems with the joints, allergy
with the joints  Szolnok	Damjanich	swimming-pool: Swimming-pool  open-air bath: 1 May – 31 August	thermal water with high throughout the year  hydrogen carbonate	rheumatism, problems salt content and alcali
	Open-air Bath	15 June – 31 August	thermal water with natrium hydrogen carbonate	rheumatism, gynaecological diseases
	MÁV Swimming-pool	15 June – 31 August and Open-air Bath	plain thermal water	
Tiszaöldvár	Thermal and Open-air Bath	1 May – 30 September	thermal water with alcalichloride and hydrogen carbonate	rheumatism, problems with the joints
Tiszaörs	Bath	throughout the year	plain thermal water	
Törökszentmiklós	Open-air Bath	1 May – 30 September	thermal water with high iron content	post-traumatic therapy, problems with the Spine, and the nervous system.



**Medicinal baths**

town	name of the bath	type of water	effects	services
Berekfürdő	Medicinal and Open-air Bath	alkali hydrogen carbonate, iodine	locomotor diseases, inflammations posttraumatic therapy	massage, traction bath, mud-pack, chiropody
Cserkeszölő	Medicinal and Open-air Bath	iodine, bromide, chloride	rheumatic, locomotor and gynaecological diseases, posttraumatic therapy	massage, traction bath, mud-pack, chiropody
Szolnok	Hotel Tiszia and Medicinal Bath	alkali hydrogen carbonate	locomotor diseases, reduction of hyperacidity	basic medical examination check up, Turkish bath, traction bath, mud-pack, sauna, medical massage, gymnastics, chiropody, dental therapy
Tiszafüred	Thermal and Medicinal Bath	alkali hydrogen carbonate	locomotor diseases, vertebral disk problems, nervous disorders combined with athropy	massage, traction bath, gymnastics
Túrkeve	Open-air Bath	alkali hydrogen carbonate, iodine, sulphide	locomotor, gynaecological, dermatological problems	tub-bath, chiropody