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The Importance and Environmental Effects of Quality Health Tourism in Hungary, the Case-study of Hévíz

Abstract

Tourism and the environment are inseparable, in other words they are interdependent, and thus the relation of tourism and its environment should not be treated as a unilateral one. The authors of this study try to give an overview on the relation of health tourism and the sensible natural environment of a famous Hungarian spa resort, Hévíz. The health and wellness tourism are exceptional areas of the Hungarian tourism—mainly due to its unique geothermal characteristics. The study aims to show the risks which are threatening Hungary's famous spa towns and the actions and measures that should be carried out to preserve and maintain these valuable natural resources. Besides these, the study also presents the possible ways to release the increasing environmental pressure of tourism, for example the reorganisation of farming system to a sustainable one is also presented.

Key words

Health tourism; Human impact; Environmental effects; Spa towns; Lake Hévíz

1. Introduction

Hévíz (Figure 1) received its fame due to the well-known medicinal lake, the *Lake Hévíz*.

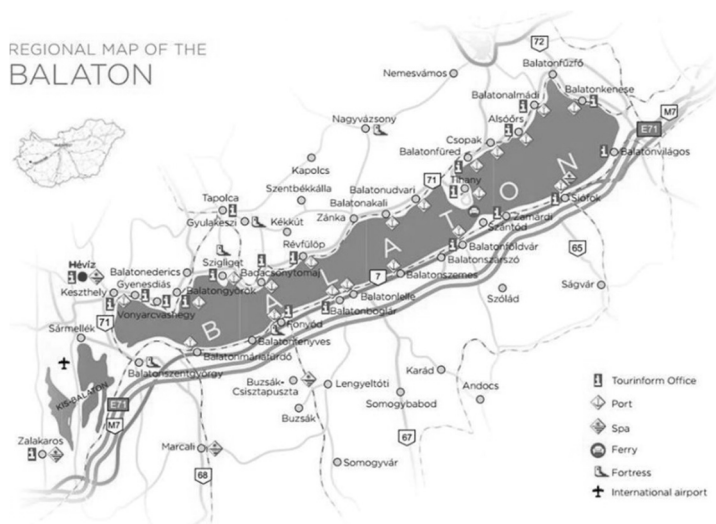


Figure 1 – The spatial allocation of Hévíz

Source: HUNGARIAN TOURISM PLC. (2014)

This tourism resource is based on a thermal-karst spring-lake with the diameter of 250 m of which crater cave can be found in a depth of 38 m (*Figure 2*). The lake has a flow rate of 30–40 l/m. The water flows through the *Upper-Triassic* main dolomite and reaches the surface at the border of the karstic rocks and the covering *Pannonian loamy sandstones* (KORDOS, L. 1984).

The lake is a „unique natural value to be protected and a popular tourism destination as well. Its water is used for medicinal purposes for a long while thanks to its temperature and composition. Though Romans were beware of the medicinal effects of the lake, it only started to develop after 1795” (Lake Protection Program of Lake Hévíz, Preparatory Study—

translated by the authors)²⁶. Besides its uniqueness and popularity in tourism, the physical environment surrounding the lake and providing the base of its tourism is a fragile system. We can say that „*Both tourism and our physical environment are open and complex systems*” (PUCZKÓ, L. 1999).

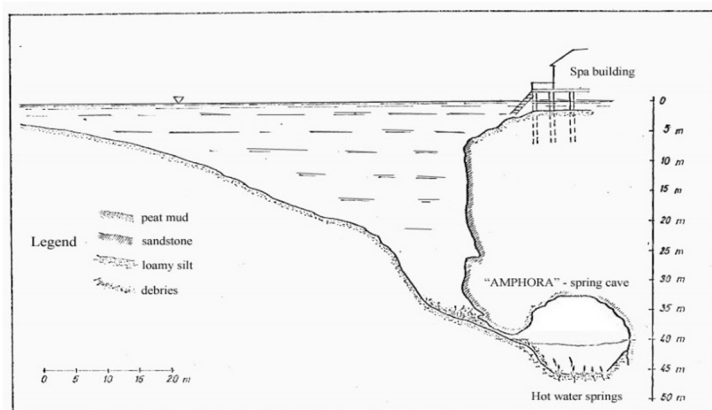


Figure 2 – The cross-section of Lake Hévíz and its spring cave

Source: AMPHORA (1976)

Tourism is embedded in and depends on its physical environment, which includes the natural—waters and their flora and fauna, the soil, geological formations, climate, microclimate, the habitats—and the human/cultural –historical sites, traditions, settlements, buildings, handicrafts etc.—resources. Thus this openness, complexity and interdependence lead to the fact that they are an integral part of each other and cannot be separated. Tourism—as all human activities—uses resources and raw materials from its environment; from the nature; has got a kind of infrastructure and emissive sources. Tourism as an economic activity

²⁶ BALATONI INTEGRÁCIÓS ÉS FEJLESZTÉSI ÜGYNÖKSÉG KHT. – VITUKI KÖRNYEZETVÉDELMI ÉS VÍZGAZDÁLKODÁSI KUTATÓ INTÉZET KHT. – A MAGYAR ÁLLAMI FÖLDTANI INTÉZET KÖZREMŰKÖDÉSÉVEL (2007)

generates profit and extra-profit with the use of natural and human resources (HAJNAL, K. *et al.* 2009). Of course this economic sphere, just like agriculture or industry, can be overused and exploited and necessarily has to compete with other activities. And we must not forget that basically tourists are consumers (although in a growing extent responsible consumers) —and not environmentalists who are aware of their consumption rate and the effects they may cause to the environment and nature (PUCZKÓ, L. 1999). Therefore, it is not surprising that in the recent years the environmental protection received an outstanding role in the relation of tourism and its physical environment. In the context of tourism environmental protection includes: *“All those human activities which intend to protect and sustain the physical environment (natural and anthropogenic), which is the base of tourism. Tourism has to minimize its disadvantageous, adverse effects and has to optimize the positive ones in accordance with the economic and socio-cultural effects as well”*—PUCZKÓ, L. 1999.

Considering all these, tourism has to be sustainable as well. Hence, tourism has to consider the bearing capacity of its natural environment and allow the resources to renew; has to realise that local communities, traditions and lifestyle are important parts of the tourism product; to accept the communities to share proportionally in the positive economic effects of tourism and to respect the interests and requests of the inhabitants of destinations regarding the development of tourism (PUCZKÓ, L. 1999).

As, the whole economy of the Hévíz region is based on tourism, therefore any change in the condition (water level, temperature and composition) of the lake has a great impact on it. The national, regional and local authorities should handle those tourism development strategies in the first place which aim to protect the rare and precious sources like water and energy and to minimise waste production (Global Code of Ethics for Tourism—GCET).

2. Aim of the study

The aim of our study is to give an overview on the relation of health tourism and the sensible natural environment of a famous Hungarian spa resort, *Hévíz*. Through our example, we would like to show the risks threatening *Hungary's* famous spa towns and what kind of actions, measures should be carried out to preserve and maintain our valuable natural resources. We also present some possible ways to release the increasing environmental pressure of tourism, like the reorganisation of farming system to a sustainable one. The environmental effects and the possible solutions, ways of development are occurring questions in the case of all the Hungarian spa towns; thus with the case study of *Hévíz*, we can give an overview on the present situation, problems and development possibilities of the Hungarian spa resorts.

3. Research methods

During our research we analysed the settlement development strategies, studied and evaluated the implementation of town concepts, made interviews with local tourism and local government experts. Besides these, we also analysed the media reports because many of the investments, developments are very new and we also used our own observations—as one of the authors is a local resident.

4. The role of health tourism in Hungary

In the last decades health tourism become one of the most dynamically developing tourism products in world tourism market (TURNER, L. 2011; CONNELL, J. 2013). Hungary has got unique geothermal characteristics with quality tourism supply, thus, it is not surprising that health and wellness are exceptional areas of the Hungarian tourism as well.

„Health tourism is an overall definition which includes both the health and wellness tourism. It means that field of tourism where the motivation of a tourist is to improve or retain his/her health (for example recovery or prophylaxis). Therefore, the tourist utilises health tourism service(s)” (AQUAPROFIT, 2007). In *Hungary* health tourism is typically based on natural

therapeutic factors (MICHALKÓ, G. – RÁTZ, T. 2011). According to the 2013 data of the KSH (2015), there were 137 settlements involved in health tourism from which 18 had been given the qualification of a health resort by the ÁNTSZ (National Public Health and Medical Officer Service). As we mentioned above „Hungary, besides possessing medicinal water stocks of universal significance, has leading positions in health tourism in certain fields of medical services as well. In the tourism development of Hungary over the last decade medical tourism and health tourism have been given a central role and have also been acknowledged by international sectoral analyses.” (JÓNÁS-BERKI, M. et al. 2014).

Hévíz is one of Hungary's internationally important and most visited spa towns beside Hajdúszoboszló, Bük, Balatonfüred, Sárvár and Zalakaros (Table 1) which have similar characteristics, thus general development proposals can be framed for them.

Table 1 – The most visited Hungarian cities/towns (spa towns with bold letters), 2014

Source: KSH (2015) – preliminary data

Most visited Hungarian cities/towns, 2014. All guest-nights (KSH)		
	City/town	Number of guest-nights
1	Budapest	8,059,154
2	Hévíz	982,760
3	Hajdúszoboszló	806,076
4	Siófok	700,611
5	Bük	680,451
6	Balatonfüred	543,801
7	Sárvár	453,159
8	Zalakaros	433,829
9	Sopron	381,537
10	Eger	374,709

The main attraction is the therapeutic water and the quality services of health tourism based upon it which is available throughout the year; therefore, seasonality is low and the environmental impact is continuous. All other attractions (baths, hotels, programmes) are based on this natural resource; thus, any change in its state has a great effect on the

economy and tourism of the towns and the inhabitants as well. *“In monofunctional spa towns health tourism is undoubtedly the catalyst of development”* (SMITH, M. – PUCZKÓ, L. 2009).

As a reason, the environmental protection should be a key task in spa towns. The visitors usually stay for a longer period of time which is important in many ways. *“On the one hand, the length of their stay influences what sort of relation a visitor can establish with local people (the shorter the residence time, the greater the chance of shallow relations). On the other hand, the cost of a visitor is lower in the case of a shorter residence time in one destination”* (PUCZKÓ, L. – RÁTZ, T. 2001). In the case of spa towns visitors usually make themselves at home and as a result care more for the local environment and this environmentally conscious lifestyle is very important from the aspect of sustainable development.

Spa towns have disposal over the higher tax income, which they can appropriate to the renewal, care of their environment. A healthy, elegant townscape can be formed thanks to the organised, clean settlement, large green areas and parks which play an important role in the image of the town as well.

5. The case study: Hévíz and its unique natural value, the Lake Hévíz

In Hévíz tourism is based on a natural element, the world famous and unique Hévíz Thermal Lake. The special supply of this lake is replenished with traditional health tourism services and treatments, the spa town milieu and a peaceful environment. The hazards presented in our case study are typical of the other spa towns of Hungary; thus the development proposals can be applied on them as well, in accordance with the local conditions.

“Hévíz owes its fame to its medicinal lake, which is the largest biologically active natural thermal lake in the world with its 44,400 square metre water surface. The medicinal water gushes out from the 38 metre deep spring crater, its average temperature in summer is 33–35 °C which does not go below 23°C neither in winter, and thus outdoor bathing is possible throughout the year. The water contains sulphurous, alkaline hydrogen

carbonated, slightly radioactive active ingredients, having a curative effect primarily on various rheumatic, locomotor, muscular and nervous system disorders, as well as some gynaecological problems." (HÉVÍZI KISTÉRSÉG TERÜLETFEJLESZTÉSI KONCEPCIÓJA, 2008)²⁷. In 2013, the number of guests entering the lake spa was more than one million.

Hévíz primarily relies on medical services, although the number of guests arriving for beauty, wellness and medical tourism (especially dental and anti-rheumatic treatments) is ever increasing. Because of the demand of tourists, quality accommodations are required, which have been built mainly in the form of hotels. In 2013, there were 23 hotels, 5 guest houses and 1 campsite ready for guests in the spa town (KSH, 2014; 2015). During the last decades, 3, 4, and 5-star quality hotels have been constantly built upon the medical tourism, and in the bigger hotels most of the known forms of medical treatments are available for guests. The therapeutic supply is completed with qualitative gastronomy, local goods, wine tourism and different activities associated with health maintenance, such as bike tours, in the recent years (HAJNAL, K. – KÖBLI, Á. 2015).

6. The Lake Hévíz and its environment

The springs feeding the lake originate from a cave developed in *Pannonian sandstone*. The cave itself was discovered in 1975, when the divers also observed the inflow of cold (17.2°C) water from the eastern side, and hot (39.6°C) water from the western side, which together resulted in an average temperature of 38.8°C at the mouth of the cave. The watershed of the cold water is located in the *Keszthely Mountains* whilst the hot water is located in the *Bakony Mountains*. The two most important parameters of the lake are its temperature and the discharge of the spring.

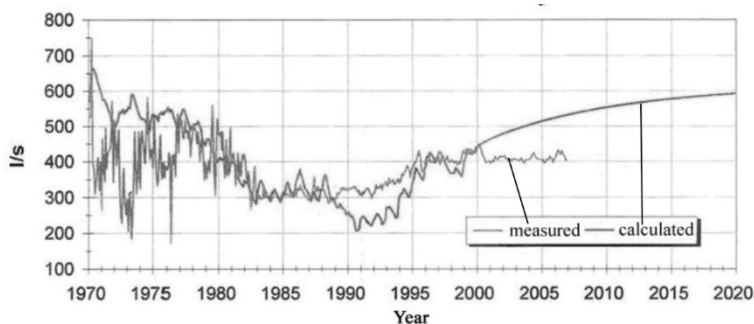
The VITUKI non-profit organisation calculated the changes in the discharge of the lake from 1970 until 2000 with the help a mathematical

²⁷ Hévíz Micro-region Regional Development Concept 2008–2018

model and with the consideration of those factors affecting water discharge. These results were then compared with the real values measured as shown on *Figure 3*. A prognosis was made with the help of this model; of which reliability greatly depends on anthropogenic and environmental conditions.

Figure 3 – The measured and calculated discharge of Lake Hévíz

Source: BALATONI INTEGRÁCIÓS ÉS FEJLESZTÉSI ÜGYNÖKSÉG KHT. – VITUKI KÖRNYEZETVÉDELMI ÉS VÍZGAZDÁLKODÁSI KUTATÓ INTÉZET KHT. – A MAGYAR ÁLLAMI FÖLDTANI INTÉZET KÖZREMŰKÖDÉSÉVEL (2007)



The town of *Hévíz* itself is located in the territory of *Zalavár*, *Zala county* in the western part of *Hungary*. Larger part of the territory is sensitive or less sensitive to surface contamination where environmentally friendly economic activities could be carried out. The lake, the surrounding safety zone and the peat-bog is extremely sensitive while the offset of the valley is less sensitive. The settlements located within the territory with the greatest impact on the lake's discharge are the following: *Hévíz*, *Alsópáhok*, *Cserszegtomaj*, *Felsőpáhok*, *Keszthely*, *Nemesbük*, *Sármellék* and *Szentgyörgyvár*, but only *Hévíz*, *Kehidakustány*, *Alsópáhok* and *Keszthely* are characterised by permanent tourism.

7. Natural hazards of Hévíz and the environmental effects of tourism

7.1. How sensible is the lake? – A case from the past

The water discharge of the lake was unfavourably affected by the excessive use of karstic water from the *Transdanubian Hills* and especially by the bauxite mining in the *Nyirád region* from the 1960s. At the beginning of the mining works, the experts were not aware of the impact on the area's hydro-geological system caused by water extraction. With the continuous mine water extraction, the springs, riverbeds and karstic wetlands were dried out and—as a result of the decreased pressure caused by the depressive area of *Nyirád*—the groundwater balance was affected, as well. The most intensive water extraction works were carried out in the southwestern part of the *Nyirád region* where more than 40 wells were established. Their discharge together reached 250–300 m³/min in the 1970s and 1980s. In this period, the amount of water extracted reached the amount of recharge in the reservoir area (ALFÖLDI, L. – KAPOLYI, L. 2007).

These interventions had an effect on the habitats, the flora and fauna, on the agriculture and on the *Lake Hévíz* as well. From the beginning of the 1990s, different measures were made to release the harmful effects. The mines were closed down and the extraction of karstic water was limited to satisfy the need of settlements for drinking water. As a result, the level of karstic water was restored (MÓGA, J. *et al.* 2014). Now the most important aims of the Lake Protection Programme are to secure the regeneration process of the lake, to reach the discharge of 550 l/s, the temperature of the medicinal lake to be not lower than 28°C, the sulphide content should reach 2,500 mg/l and to inhibit the spread of invasive species (plants, animals) (*Lake Protection Program of Lake Hévíz, Preparatory Study*)²⁸.

²⁸ BALATONI INTEGRÁCIÓS ÉS FEJLESZTÉSI ÜGYNÖKSÉG KHT. – VITUKI KÖRNYEZETVÉDELMI ÉS VÍZGAZDÁLKODÁSI KUTATÓ INTÉZET KHT. – A MAGYAR ÁLLAMI FÖLDTANI INTÉZET KÖZREMŰKÖDÉSÉVEL (2007)

7.2. Other risks of the lake and its environment

Besides the past effects of mining, there are several other conditions which threaten or can influence the lake and its environment. These include:

- Drying wetland area as a result of the lack of precipitation and the improper interventions into the groundwater system;
- Harmful anthropogenic interventions, illegal water extractions (illegal karstic wells, water extraction of the spas and wellness centres, mineral water extraction);
- Constructions resulting in the covering of the surface around the lake;
- The increased extraction of karstic and thermal waters as a result of the developments of *Transdanubian thermal spas*;
- The land use and the growing urban areas are threatening the ecological system of the lake and its surrounding;
- The settling and spreading of non-native species is another risk factor;
- Tourism threatens the species;
- The growing health-tourism in the area means a threat on the lake and the surrounding wetland. (*Lake Protection Program of Lake Hévíz, Preparatory Study*)²⁹

7.3. Natural hazards caused by increased traffic

The quality therapies and the additional tourism services attract a huge foreign and domestic clientele resulting in the increase in traffic exposing the spa towns to a great environmental burden and in several cases endangering the natural resources. The bus station at the entrance of *Lake Hévíz* causes significant environmental and aesthetic problems, so it is one of *Hévíz's* biggest environmental problems. The bus station contributes to a decrease in air quality, it is noisy and not an attractive scene

²⁹ BALATONI INTEGRÁCIÓS ÉS FEJLESZTÉSI ÜGYNÖKSÉG KHT. – VITUKI KÖRNYEZETVÉDELMI ÉS VÍZGAZDÁLKODÁSI KUTATÓ INTÉZET KHT. – A MAGYAR ÁLLAMI FÖLDTANI INTÉZET KÖZREMŰKÖDÉSÉVEL (2007)



Figure 4-5 – Environmentally dangerous street along the Lake Hévíz
Pictures photographed by KÖBLI, Á. (2014)



in the middle of a health resort. The only positive aspect of its location is that the elder visitors arriving by bus can easily reach the lake. In the recent years, several plans have been made on the relocation of the bus station and in 2013 a traffic concept was made which establishes the territories to be developed considering the needs of the whole region.

According to the plans the new bus station would be placed on the confines of the town, along the new bypass; thus decreasing the crowdedness of the town centre. The town plans new electric buses which would serve as a local bus and would connect the town centre with the *Hévíz–Balaton Airport*. The present location of the station could function as a public place; thus could be the home for diverse programs and the centre of social life for the local people and the visitors as well. Moreover, new green areas could be established, ameliorating the climate in the spa town.

From an environmental aspect, the *Ady Endre street* means a great problem as it goes straight along the lake, not more than 8–10 meters away from it (*Figure 4–5*). This is very dangerous as the great traffic—both cars and buses—can easily pollute the water and also endangers the natural environment surrounding the lake. It would be very important to redeem this road or to decrease the rate of traffic.

8. Some ways toward a sustainable tourism in the region

8.1. Lake Protection Program

The protection of the local health/therapeutic factors and the long-term preservation of the environment is an outstanding task for all spa towns and should be placed before economic aims. To secure environmental sustainability in Hévíz “*The Lake Protection Program of Lake Hévíz*” (the aim was to protect the lake’s ecosystem and the natural values and framing the aims ensuring both the qualitative and quantitative protection) and the relating law system was formed (HÉVÍZ VÁROS TERÜLETFEJLESZTÉSI KONCEPCIÓJA, 2015)³⁰.

³⁰ Hévíz Regional Development Concept 2015

The actions against activities decreasing the water level and against the pollution of surface and groundwater are of high priorities considering the preservation of the lake's condition.

Among the measures of the 'Lake Protection Program', the renovation of the monitoring system could be highlighted: the regular measurement of the lake's water output, temperature and the water level of the surrounding karst- and groundwater wells.

The quality of the spring water, originating from the spring craters of *Lake Hévíz*, greatly depends on the quality of water from the infiltration area. Therefore, the tasks of lake protection reach out from the administrative boundaries of the town, thus the settlements concerned should co-operate in order to execute the proper tasks. The long term protection of the lake's surroundings is also a high priority task. The *Lake Hévíz Nature Reserve* includes the lake itself and the surrounding swamp forest areas functioning as a protective buffer area. In the last decade, we have experienced a gradual decrease in the state of the forests. *"The most important element of nature protection rehabilitation is to be able to regulate the water balance of a territory in order to stop deterioration"* (HÉVÍZ VÁROS TERÜLETFEJLESZTÉSI KONCEPCIÓJA, 2015). In the territory of the *Nature Reserve*, a park may be established which would be suitable for leisure and recreation. This would supply a long-lasting need both for local people and for the tourists arriving into the town. All the same *Hévíz* and its territory have got favourable climatic conditions and the town is characterised by large green areas, parks and flowery streets. It is also favourable that 21% of the town is forest which plays an important role in the regulation of the local climatic conditions. That is why the expansion of these green areas, the rehabilitation of the extant ones and to fill them with different functions is so important.

8.2. Utilisation of renewable energy resources

In the recent years, there are more and more local, alternative solutions—based upon the unique characteristics of the Hungarian spa towns—to release the energy dependence. *"In the case of Hévíz a main aim is to lower the energy costs, to use renewable energy sources and to*

urge a gradual switch to the use of such resources" (HÉVÍZ VÁROS TERÜLET-
FEJLESZTÉSI KONCEPCIÓJA, 2015). There is a great opportunity in the use of
geothermal, wind and solar energy, as well as in the utilisation of flow-
ing thermal waters in Hévíz. The co-operation with the *Pannon Univer-
sity of Keszthely*, a neighbouring town, could be an excellent help to exe-
cute the innovations regarding the use of renewable energy sources by
which the region energetically could be increasingly independent.

Plans have been made for the utilisation of areas endangered by
floods and inland waters, thus inadequate for agricultural purposes, as
well. The special characteristics of these territories would be suitable
for the cultivation of energy willow which favours the wet environment.
But, this would have more negative results than profit. Wetland areas
are ecologically very fragile territories, they are under general protec-
tion as biodiversity is thriving in these areas. The flora has a great role
in the cleaning of water percolating into lower layers. If this diverse bi-
ome would be destroyed and cultivated with a monoculture of energy
willow, then it would cause a severe damage to the natural environment
of the region. One of the most spectacular innovations in Hévíz is the
staircase (*Figure 6–7*) heated by the thermal water, flowing from the ho-
tels, during wintertime.

This was the own investment of the town's government. *"The 30°C
thermal water from the pools of hotels is conducted through two thick
tubes, under the almost 70 m long staircase (bridging a height difference
of 11 m). New handrails, ramps and LED lamps were placed along the
staircase as well, thus decreasing light pollution"* (PAPP, G. 2013). The
town is planning to renovate more staircases as there are many rheu-
matic and other patients with locomotor diseases, thus accessibility is
of great importance.

Thanks to these projects, an elegant, healthy, intimate townscape
and environment can be formed which would be able to attract tourists
itself.



Figure 6-7 – Staircase heated with hot water in Hévíz

Pictures photographed by KÖBLI, Á. (2014)

8.3. Organising a sustainable agricultural system

When it comes to catering connected with health tourism, quality gastronomy should play a great role. The visitors can eat healthy foods contributing to their recovery. The hotels and restaurants offer foods from fresh, raw materials from bio farms provided by local farmers. Eco-farms are more resilient and can easily adapt to seasonal and other demands, they are able to offer unique services, produce quality goods with low ecological burden and secure fresh, healthy foods for the guests.

There are several hotels and restaurants which import their food-stuff in large quantities. In the respect of sustainability, these materials should originate from local entrepreneurs. Certainly, there are some of which cannot be produced locally, but producers should aim to purchase goods from nearby merchants in the region or county. The most ideal situation would be whether the special goods would originate from *Fair Trade* commerce. Although, the prices of these products are higher, it would contain the costs of a fair wage, trade and environmental burden, but at the same time they would be unique products such as

coffee, tea, chocolate, spices and hand crafts of faraway places and in addition more and more guests search for *Fair Trade* products. The marketing of such products together with local ones is the best solution as they are complementary supplies. Tourism is only able to change the economy and society of a given region positively, if it is able to integrate more and more local stakeholder into the economic processes. It is important to invest a part of the incomes of hotels into the local economy, thus the region could be developed efficiently. Hotels shop in bulk, saving the costs of transportation, packing and custom fees, can have a more direct relationship with the farmers which makes purchasing more efficient.

There is a growing need for healthy and quality foodstuffs for the hotels and restaurants to rely completely on local economy. Therefore, it is important to establish a sustainable, local agricultural system. *“The sustainable agricultural systems are such complex systems which besides plant cultivation, animal husbandry, forestry, wildlife management and fishery include the half-processing of these, the tasks of some settlement types and the employment of rural population, the subsistence of local communities and their traditions, the environmental protection and tourism of the regions”* (HAJNAL, K. 2010). *Hévíz* has got very favourable physical-ecological conditions; there are large natural or nearly-natural areas/habitats and traditionally cultivated landscapes. The lands of this area are suitable for the establishment of sustainable agriculture as they have a great agricultural potential. Such lands include the not utilised outskirts and the uneconomically used lands as well. Although, *Hévíz* has got only a few outskirts, the borders of the nearby settlements (*Alsópáhok, Felsőpáhok*) reach almost to the inner areas. But the micro-region has got adequate areas; therefore, it is very urgent to reshape the local agricultural system to a sustainable one within the frames of micro-regional co-operation.

They were profitable as there would be a great demand and market thanks to the proximity of *Lake Balaton* and *Hévíz*, they would have enough income and so could further develop other sectors as well. The hotels could support the development of local economy; they would be

able to deal with them so their offer would be better with organic products. As the tourism supply of *Hévíz* is based on natural resources, the environmental protection is a key issue and the protection against the contamination of surface and groundwater as well.

Since organic farming do not use chemicals and/or only fair ones in a minimal amount, they aim to increase biological diversity where environmental and nature protection are the part of it. *"Their basic aim is to keep the natural environment, to protect natural values with the integration of a reasonable profitability. These farms, agricultural areas were developed within the territory of nature protection areas, near endangered water tables or other substantial natural values and the preservation or regeneration of the quality of a given region within the frames of their production structure is of significant importance"* (KOVÁCS, G. 2008).

The best solution would be—both in short and long-term—to reshape the agricultural system of the *Hévíz micro-region* into qualified (IFOAM, Biokontroll Hungary) organic farms. The local governments have got the responsibilities to organise the tasks and to ensure subsidies.

9. Conclusion

In *Hévíz*, the lake, the therapeutic treatments and the programs of the wellness hotels attract tourists and patients all over the year, thus the environmental impact is continuous which results an increase in traffic, exposing the spa town to a great environmental burden and in several cases endangering the natural resources. The bus station at the entrance of the *Lake Spa* causes significant environmental and aesthetic problems, so several plans have been made regarding the relocation of the bus station and the town also plans new electric buses which would serve as local buses and would connect the town centre with the *Hévíz-Balaton Airport*.

As the whole economy of the *Hévíz region* is based on tourism therefore, any change in the condition (water level, temperature and chemical composition) of the lake has a great impact on it. Thus, to handle tourism development strategies and to protect the environment—

which aim to protect the rare and precious sources like water and energy and to minimise waste production—are the main tasks of the national, regional and local authorities.

The effects of bauxite mining in the *Nyirád* region from the 1960s exemplify the sensibility of the *Lake Hévíz*. The continuous mine water extraction caused the springs, riverbeds and karstic wetlands to dry out and the decreased pressure caused by the depressive area of *Nyirád* the groundwater balance was changed as well. Finally in the 1990s the mines were closed down and the extraction of karstic water was limited to satisfy the need of settlements for drinking water. As a result the level of karstic water was restored. To secure environmental sustainability in *Hévíz* and the regeneration of the lake the so called ‘Lake Protection Program of Lake Hévíz’ was worked out in 2007.

Hévíz and its surroundings have also got very favourable natural-ecological conditions; there are large natural or nearly-natural areas/habitats and traditionally cultivated lands which are suitable for the establishment of sustainable agriculture. Besides these, the micro-region has got adequate areas as well; therefore, it is very urgent to reshape the local agricultural system to a sustainable one within the frames of micro-regional co-operation.

There is a great opportunity in the use of geothermal, wind and solar energy, as well as in the utilisation of flowing thermal waters. The co-operation with the *Pannon University* could be an excellent help to execute the innovations regarding the use of renewable energy sources by which the region energetically could be more independent.

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