

DIGITALISATION IN ANGLING TOURISM: INTRODUCING NEW TECHNOLOGIES TO A TRADITIONAL TOURISM PRODUCT

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Abstract: In recent years, the use of digital solutions in tourism has accelerated and smart solutions are now used even in areas that are less technology-oriented, such as angling tourism. Angling itself and angling tourism seem rather traditional, definitely not tech-savvy activities, ones that can be categorised among the ecotourism or slow tourism products. It is not to say, however, that angling tourism does not evolve and is immune to the trends released in tourism. Recently there were huge changes in the regulation and organisation of angling in Hungary (and further changes are expected to come), which brought about a surge in the number of anglers in Hungary and the development of angling tourism. By now angling has become by far the hobby in Hungary done by the largest number of people; after a steady growth for decades, the number of registered anglers has by now reached almost one million persons, i.e. approximately ten per cent of the Hungarian population are anglers (and so potential target group of angling tourism), which makes the investigation of the topic of angling tourism really important – not to mention the fact that not only domestic but also inbound angling tourism is characteristic of Hungary. Among the changes, in 2019 the electronic support of angling administration was launched through the so-called HORINFO system run by MOHOSZ, the Hungarian National Angling Association. This paper summarises the changes and their consequences, explores the current digitalisation of angling tourism, its benefits, and examines the acceptance of new technologies by anglers. The results of the research show that the digitalisation and the introduction of new technologies accelerated during the Covid-19 epidemic, but their adoption by angling tourism has been slower. The study shows the importance of digitalisation in monitoring the environmental pillar of sustainability and the interventions needed. The study also provides a thorough investigation of the Hungarian and international literature of angling tourism, rather deficient to date, and gives recommendations on the further development of the HORINFO system. The significance of the issue is enhanced by the fact that Hungary now has a National Angling Development Strategy to strategically found further angling tourism developments.

Keywords: digitalisation, angling tourism, Hungary, sustainability, monitoring

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INTRODUCTION

Angling tourism is still a poorly known and recognised form of tourism, and tourism research has largely ignored the importance of angling tourism, as evidenced by recent literature review by Hannonen and Hoogendoorn (2022). According to this study, less than 100 publications on the management of angling tourism, angling tourism in general and the impact of angling tourism were published between 1993 and 2022, although it has been proved that angling tourism is, contrary to previous assumptions, neither local nor low-income form of tourism, not an individual and not a fixed activity, but also strongly linked to the possibility of using other complementary services (sports, gastronomy, wellness) beyond the needs of family members and accompanying persons, which reinforces its “four-season” character and its significant contribution to the economy (Dérer, 2015; Hannonen & Hoogendoorn, 2022). Angling tourism is widely cited as an area of national economic importance in published international studies (Brown et al., 2012; McManus et al., 2011; Hall, 2021). According to Brainerd (2010), recreational angling has important positive social, economic and environmental impacts in Europe. Hoitsy et al. (2012) consider recreational angling tourism as a complex industry (Ivancsóné Horváth & Bánhidi, 2015).

Between 2013 and 2018, significant changes took place in the regulation and organisation of angling in Hungary. In 2016, the right to fish in natural waters was transferred to angling organisations, which marked the beginning of a new era. The process brought with it a surge in the number of anglers in Hungary (Figure 1) and the development of angling tourism. 2019 was another important milestone, when the electronic support of angling administration was launched by the HORINFO system (Horgász Informatikai Rendszer, i.e. Anglers’ IT System). In this paper the authors explore the

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current digitalisation of angling tourism and analyse secondary data to investigate the adoption of new technologies by anglers, and its applicability for sustainability monitoring.

In the period of the Covid-19 epidemic, digitalisation and the introduction of new technologies have accelerated, but their adoption in angling tourism has been slower. The percentage of actual users of new technologies is still only 10-15%, but the widespread use of digitalisation can help to prevent overtourism in certain areas, to integrate previously unexplored areas into angling tourism, and to implement guided fish stocking (Ivancsóné Horváth & Happ, 2023).

LITERATURE REVIEW

Angling tourism is a special active tourism product (Csapó & Gonda 2019), as angling is a licensed activity in Hungary. Angling is open to anyone after successfully passing a free exam. Nowadays, it is an increasingly popular leisure activity, often combined with travel and services, thus fulfilling the conditions of tourism. In 2020, the Covid-19 pandemic showed that it was less vulnerable than many other tourism products, as it was one of the few outdoor activities (along with hiking, trekking and ecotourism) that could be practised even during the closedowns, and this fact led to a large increase in the number of anglers (Figure 1), but even during the economic difficulties of 2022-23, there was only a slight decline.

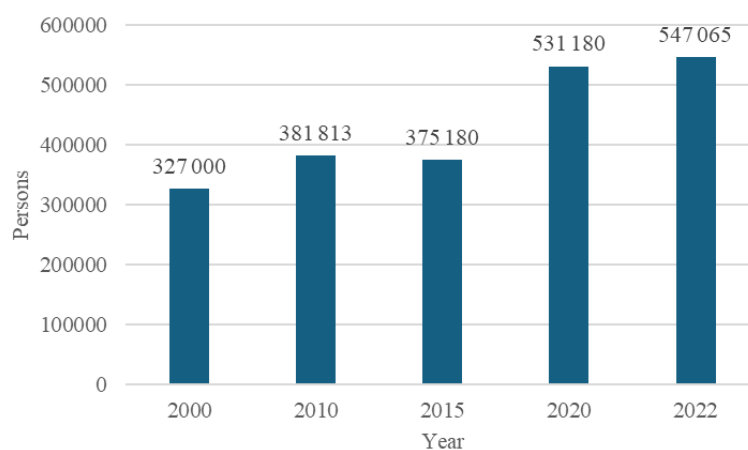


Figure 1. Growth in the number of anglers with state angling licence in Hungary, 2000-2022 (Source: Own editing based on MOHOSZ 2023 data)

Several literatures describe that angling offers a good opportunity, an equal chance for socio-economically underdeveloped areas (Wilson et al., 2001, Ditton et al., 2002, Ryglóvá, 2007, Navratil et al., 2009, Brown et al., 2012, Marton et al., 2016). Not only natural water bodies like seas (Vegas Macias et al., 2023), rivers, and natural lakes can be potential venues of angling tourism, but so can be artificial lakes and reservoirs, which can actually become leading tourism attractions with adequate management, especially in rural areas that do not abound in other attractions, as proven by evidence from Poland and Hungary (Duda-Gromada et al., 2010). Thus, as a narrow segment of tourism, angling tourism is given a prominent role in rural development. During and after the Covid epidemic, the demand for eco- or green tourism increased significantly compared to mass tourism (Gonda, 2022). Angling tourism is a possible alternative, in many places the only, sometimes complementary, tourist attraction. An advanced angling tourism requires angling-friendly accommodation, catering facilities and ancillary services. Angling tourism can be important for the life of a region, as it can be an opportunity to extend the programme of other holidaymakers, to extend their stay; it can attract visitors almost all year round (<http://horgaszturizmus.hu>). Of course, in some destinations it can also become a primary attraction, as demonstrated by the intensive and internationally renowned angling tourism on the rivers Po in Italy and Ebro in Spain (Banha et al., 2024), but there are also examples in Hungary for angling tourism being the primary or exclusive tourist attraction in the autumn-winter season around Lake Tisza, or throughout the year in the Háromfa or Bátorterenyé areas (Ivancsóné Horváth & Dérer, 2023; Halasi-Kovácsné Benkhard et al., 2013).

It should be stressed that a significant proportion of the prime destinations are linked to the less developed areas, making the development of angling tourism more valuable for a number of reasons, due to its complex social and local community impact. In addition to or as a complement to angling tourism, ecotourism can be a primary tourism product in these areas: as a result of delayed (or almost non-existent) socio-economic development, the state of nature has remained close to its original state in many of Hungary's external and internal peripheries, and this previously clearly disadvantaged situation is now a major development resource, at least in the field of eco- and angling tourism (Marton et al., 2016). Also, angling tourism can be a valuable asset in strengthening local traditions and preserving heritage, as shown by the case of the Maltese fishing village Marsaxlokk (Vegas Macias et al., 2023). Hungary is located in the Carpathian Basin, in the catchment area of the Danube River. The entire territory of the country is spotted by rivers of different sizes, the largest lake in Central Europe, Lake Balaton, is located here, but there are also many other lakes and reservoirs of great importance for angling tourism, making almost all regions of the country potential sites for angling tourism (Raffay, 2009; Raffay, 2022).

Before the river regulations started in the 19th century, a significant part of the territory of present-day Hungary was permanently or intermittently covered by water, where specific ecosystems and, based on them, specific forms of life and management systems developed. With the draining of the wetlands, the earlier land-use model disappeared, and it is

largely only through the work of ethnographers and other researchers that some information about ancient land-use patterns and occupations, and, more broadly, about the way of life, has been preserved. The objectives that were the driving force behind the former water management actions (mainly to gain land for cereal production and to improve water transport) have lost much of their importance, while other aspects have become much more important (e.g. irrigation, large-scale fish farming and, more recently, recreational functions and protection against the negative effects of climate change). Today, in addition to the undoubted benefits of water management, it has been shown that it has also caused serious problems. Multidisciplinary, integrated water management, at least partial restoration of floodplain management on sites that are still suitable, could solve many of the problems and provide a way of using the former floodplains that is much more in tune with the social, economic and, of course, environmental requirements of today. If successful (social and, increasingly, professional support seems to be assured, see Lóczy et al., 2016; Schindler et al., 2016), this could have a positive impact on angling tourism, both directly (creation of valuable new ecosystems and angling sites) and indirectly (increase in the natural fish reproduction) (Raffay, 2018).

The rise of angling in tourism

The role of angling has changed from time to time throughout history. Initially, the sole purpose of the forms of catching fish that preceded sport angling was to obtain food, but today the emphasis has shifted to recreation. However, to achieve this, a change of approach was needed, and a number of major changes in fish management, organisational structure and resource allocation were necessary, based on changes in the legal framework. Angling itself was put on new grounds in 2013–2018 in Hungary, with the legislative environment being developed in several stages. Act CII of 2013 on Fish Management and Fish Conservation gives priority to the development of recreational angling and angling tourism over all other fish management uses. In 2016, the right to manage natural waters was granted to the Hungarian National Angling Association (MOHOSZ) on a lease basis and through it to the associations on a sublease basis. Commercial angling in natural waters in Hungary has thus ceased. In addition to the hectic lifestyle of our time, there is an increased demand for a civilised way of spending leisure time in nature (Ivancsóné Horváth & Ercsey, 2017), which can be provided by angling, among other things.

Angling is becoming more and more popular in Hungary, and more and more people are trying more distant angling opportunities and combining angling with other primary motivations for travelling, either at home or abroad (Ivancsóné Horváth & Dérer, 2023). Today, the number of registered anglers in Hungary is already above 1,000,000 (MOHOSZ, HORINFO data, 2023), compared to just over 400,000 in 2016. Since 2015, the number of foreigners buying a state angling card in Hungary has more than doubled. A total of 24,177 anglers from 58 countries (Figure 2) have bought state angling permits (Ivancsóné Horváth & Happ, 2023).

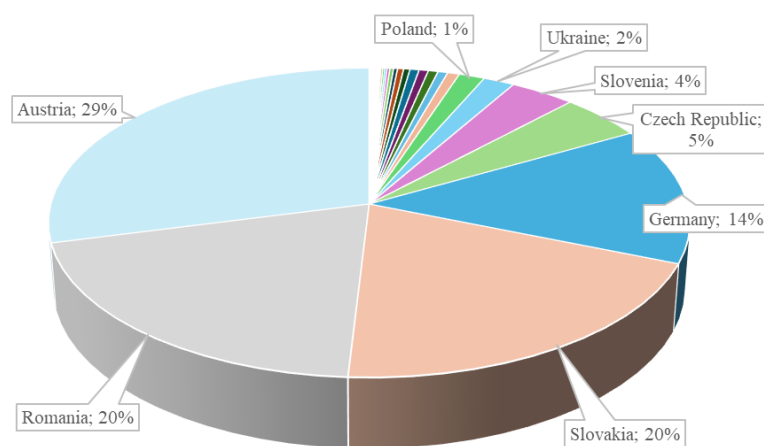


Figure 2. Foreign nationals who have bought a Hungarian state angling card, by country (Source: MOHOSZ, HORINFO system, 2021 in: Ivancsóné Horváth & Happ, 2023)

Ecotourism, sustainability and the digitalisation of angling tourism

For travellers seeking a quality angling experience, well-regulated recreational angling is an economically viable use of natural resources that is both profitable for local communities and sustainable for ecosystems. In some parts of the world, recreational angling can be the primary tourist attraction and, if practised with an ecotourism approach, can be a vital component of sustainable development. A key attraction of ecotourism is that it can make a positive contribution to both conservation efforts and the local economy (Honey, 1999). The concept of ecotourism (Zwirn et al., 2005) encompasses 3 main dimensions: a focus on nature, sustainable management and environmental education (Blamey, 2001). Angling is generally considered to be a consumptive activity that consumes resources (Sharpley, 2006; Fennell, 2007) – although “catch and release” angling contradicts this, activities that do not provide a consumptive experience have a lesser impact and should therefore be considered clearly ecotourism. The emergence and widespread adoption of catch and release recreational angling has created unprecedented opportunities for angling ecotourism. Advances in angler ethics also contribute to the potential sustainability of recreational angling. The National Marine Fisheries Services’ Angling Code of Ethics, developed with the participation of angling groups and conservationists, requires limiting catches by species and size, and using techniques that cause the least possible damage when fish are released (NMFS, 1999).

However, angling tourism must also avoid overtourism to maintain an ecological balance. Overtourism has been found not only in large cities and popular resorts, but also in natural areas (Beeton & Benfield, 2002; Weiler et al., 2018; Butler, 2018), and although it is less prevalent in angling tourism, its development must be prevented due to the fragility of ecosystems.

Angling ecotourism also faces the threat of greenwashing. If high standards are not set, some operators will use the label ecotourism to promote traditional, unsustainable angling tourism practices (Zwirn et al., 2005).

A system of sustainable tourism development guidelines and management practices is needed in all forms of tourism and in different destinations. The principles of sustainability apply to the environmental, economic and socio-cultural aspects of tourism development and an appropriate balance between these three dimensions must be struck to achieve long-term sustainability¹. Sustainable tourism therefore

1. Optimises the use of environmental resources that are key elements in tourism development, maintaining basic ecological processes and contributing to the conservation of natural heritage and biodiversity;

2. Respects the socio-cultural authenticity of local communities, preserves their built and living cultural heritage and traditional values, and contributes to intercultural understanding and tolerance;

3. Ensures viable, long-term economic activity that delivers socio-economic benefits for all, including stable employment and income generation. It provides social services to local communities and contributes to poverty alleviation².

The competitiveness of tourism is closely linked to sustainability, as the quality of tourism services and the attractiveness of destinations are strongly influenced by their natural and cultural environment, as well as by the satisfaction of tourists and the well-being of the local community.

Nowadays, sustainable development and sustainability are an integral part of the debate on how tourism can use natural and social resources to generate economic benefits. This has led to a growing need for public and private stakeholders in tourism to consider the equitable distribution of economic benefits, the minimisation of negative socio-cultural impacts on local communities and tourists, and the protection and enhancement of the natural environment through tourism activities.

Tourist destinations must be constantly alert to social, economic and environmental challenges. To measure the sustainability performance of destinations, the European Commission has developed the European Tourism Indicator System (ETIS)³. ETIS is an indicator system that is a tool for all destinations in the tourism planning process, an easy-to-use monitoring system that allows them to collect data and information to monitor their performance year by year. It is important to underline that the indicators defined by ETIS are not a qualification system but rather an information toolkit, making the system useful for all stakeholders, policy makers, tourism businesses and other interested parties.

With the help of indicators, the following benefits can be achieved in destinations:

- better information for decision-making,
- effective risk management,
- prioritisation of potential projects,
- performance comparison,
- greater community engagement and support from tourism stakeholders,
- enhanced visitor experience,
- increasing efficiency/cost savings,
- increase in value per visitor⁴.

ETIS includes 43 core indicators and an indicative set of additional supplementary indicators. The system can be used entirely on its own or integrated into existing destination monitoring systems. The indicators can be grouped into four categories:

1. destination management;
2. social and cultural impact;
3. economic value; and
4. environmental impact.

Destinations can choose the most relevant indicators that they want to monitor.

In the case of angling tourism, one possible set of indicators is aimed at controlling tourism activities. In this group, the most important indicators are the number and density of tourists. Based on the indicators used in practice, it can be seen that destinations use different indicators to map the volume of tourism. Indicators such as number of tourists, density of tourists, intensity of tourism are often used to compare with the maximum carrying capacity or to estimate this capacity (ecological constraints, infrastructure capacity, etc.) (Table 1).

Table 1. Indicators of the volume/value of tourism (Source: UNWTO: Indicators of Sustainable Development for Tourism Destinations: A Guidebook ISBN 92-844-0726-5)

Issue	Indicator
Number of tourists visiting the destination	Total number of tourists (average, monthly, peak) (categorised by type of activity)
Measuring and management of the tourism intensity of the destination	Number of tourists in the destination per square kilometre of destination: average number/peak month average/peak day

The monitoring of tourism performance and the use of indicators only become meaningful when they are used in tourism planning and management processes. Management strategies for the management of angling tourism focus on

¹ Indicators of Sustainable Development for Tourism Destinations: A Guidebook ISBN 92-844-0726-5

² UNWTO Conceptual Definition 2004

³ https://single-market-economy.ec.europa.eu/sectors/tourism/eu-funding-and-businesses/funded-projects/sustainable/indicators_en

⁴ European Union (2014): The European Tourism Indicator System, ETIS toolkit for sustainable destination management

several (often case-specific) issues (Hannonen & Hoogendoorn, 2022). Looking at the research in recent years, the issue of achieving sustainability in angling tourism is also addressed by several researchers (Table 2).

Table 2. Sustainability research in angling tourism (Source: own collection)

Author	Research topic
Arlinghaus et al., 2016	Proposals to promote sustainable recreational angling at global level
Borch, 2004	Ensuring sustainable management of recreational angling
Cawley, 2017	A strategic approach to promote holistic sustainability
Greiner et al., 2013	Recreational anglers' behaviour
Solstrand, 2013	Management strategies for sustainability in angling tourism
Solstrand and Gressness, 2014	Management techniques to influence environmentally conscious behaviour

The rise of digital and smart solutions in tourism

In angling tourism, as in all areas of tourism, the use of digital tools has started, and smart technologies are emerging in more and more areas. In addition to studies of solutions in the field of tourism (Happ, 2013; Happ et al., 2020; Kökény & Miskolczi, 2022; Csapó et al., 2023), we also find studies that focus on angling tourism and examine its development through the emergence of new digital tools (Ivancsóné Horváth & Happ, 2023).

These new solutions also help to strengthen the attitude of environmental sustainability. Most studies dealing with this area are relatively new, like the study on the possibilities and challenges of the (expectedly increasing) use of digital tools in the research, monitoring and management of recreational angling (Lennox et al., 2022), or on the opportunities that digital tools provide for including fishing communities in the provision of meaningful experiences for tourists, enhancing the overall tourist experience (Vegas Macias et al., 2023).

In their call for a Digital Green Deal, Santarius et al. (2023) argue that digitalisation can be a double-edged sword regarding environmental sustainability, with its needs for materials and energy way beyond expectations, which poses a threat to transgress our planetary boundaries. In our view, however, digitalisation in angling tourism promises much more potential gains than it means threats: digital licences replacing paper-based ones, digital logging of catches allowing angling venue owners and managers to better plan fish stocking, with limited transportation needs etc. means that less resources are used in angling tourism with the smart use of digital solutions.

The use of visitor management and digital traffic diversion in a destination offers an opportunity to develop and maintain sustainable tourism and control the number of tourists. In Hungary, this can be helped by the HORGÁSZ application linked to the HORINFO Angling Information System's registration software, which allows anglers to indicate where they are, and also allows catches to be recorded online in the digital logbook, and as the catch is linked to the location, the stress on the area can be measured. The monitoring of purchasing angling licenses by angling spots allows the estimation of the annual traffic of an area, its distribution over time, and thus the measurement of seasonality. Day and week licences provide accurate data, while annual licences can only be used to calculate the turnover from the angling day data processed afterwards. It is compulsory to upload the catches of the previous year by angler, by angling venue, and by species of fish into the HORINFO system. This will allow the catch data in terms of quantity and species composition to be assessed in each angling venue, so that the fish stockings of angling organisations can be more accurately attributed to angling venues, thus preserving the species composition. Digitalisation allows spatial and temporal monitoring of angling.

Angling takes place in several venues in protected areas, but even in non-protected areas it is important to minimise negative impacts through proper planning, management and monitoring, i.e. the development of angling tourism should only be done with the ecological aspects of sustainability in mind.

METHODOLOGY

The anonymised metadata that can be extracted from the HORINFO system already offers, albeit limited, possibility to develop monitoring of angling tourism and thus to promote sustainability. The study was carried out by metadata analysis of 658,164 angling venue licence sales data anonymously for the year 2022. For the analysis, the validity period of the angling licences sold, the corresponding angling venues, the sales methods, and only the postcode and year of birth of the eligible angler were obtained, without any other data that would allow identification, thus ensuring the anonymity of the research.

The investigation covered several areas:

- Firstly, the online sales channel, one of the four sales channels⁵ used for licence sales, was examined to explore the extent to which anglers use the online licencing option.
- Second, to test the monitoring indicators, the number of licences per angling venue sold and the postcode of the angler who bought the angling licence were examined. In this way, the authors were able to analyse the visitation of angling venues and the distance of the trips, the visitation of each angling venue according to whether it is a local, county, regional, national or international attraction.

The research was limited by the validity period of the licences, as the exact time of use cannot yet be determined for annual licences, and the actual venue visited for each pooled licence, only the group of angling waters, which is mostly county-specific. Both problems will be solved in the future by the mobile application, which will store both the day and the exact location of the angling trip and record in real time the species and weight of fish caught and kept.

⁵ The four channels are: direct purchase from the fish farmer; purchase from a service provider under contract with the fish farmer; purchase from a distributor under direct contract with Horgászjegy Kft; online purchase.

The investigation was not, and could not have been, exhaustive, as currently the use of the HORINFO system for licence sales is only mandatory in areas leased by the state to the Hungarian National Anglers' Association and subleased by MOHOSZ to its member organisations, not at municipal and privately owned angling waters, but in 2023 there were 2,381 registered angling venues in Hungary with a total surface area of 157,486 hectares, of which the vast majority of natural waters are state-owned: about 135,000 hectares (85.7%) belong to the MOHOSZ, so that a large part of the angling tourism can be analysed using the data obtained from the survey.

RESULTS AND DISCUSSION

For angling tourism, as a sport/water-based tourism, sustainability is a key issue, connected to all three pillars. As possible indicators for monitoring, the factors examined are mainly related to the natural pillar but can also be used indirectly to obtain more precise tourism data, as they can be used to estimate the number of angling tourists in a given area, the number of sending countries for foreigners, the average length of stay of angling tourists, and seasonality.

First, the current use of digitalisation in relation to licencing was examined, based on anglers' willingness to buy licences online. The expectation before the scheme had been that more and more anglers would recognise the benefits of the convenience. However, as the process is very slow, only a quarter of anglers are taking advantage of the online system (Figure 3).

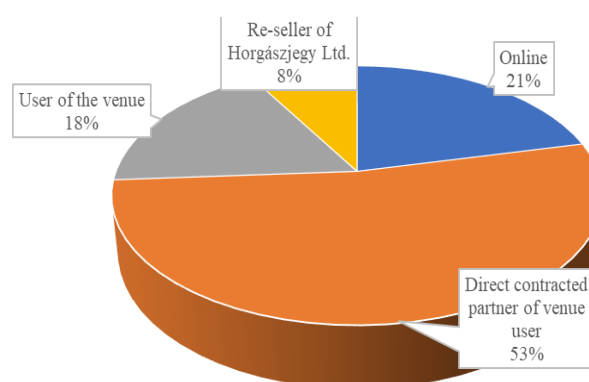


Figure 3. Distribution of angling venue licence sales between different channels in 2022 (Source: Own editing based on HORINFO, 2022)

If we look at the same data in terms of value (HUF), we find an even worse ratio, because in this case online sales only account for 8%, which means that anglers are taking advantage of online sales for day and week licences, while annual licences are still bought at various offline sales points, such as associations and angler shops. Paradoxically, this is precisely what proves the need for digital services for the development of angling tourism, as the majority of angling tourists, when travelling to distant venues for short stays of a few days or weeks, tend to buy their licences online in advance, as opposed to angling close to home, where they prefer to buy annual angling licences in the traditional way at the beginning of the year. Typically, a regional licence for a given venue is only available from points of sale near the angling venue.

The HORINFO system is constantly evolving, with more service modules being added every year. In 2023, the Discovery module was launched. The launch of the module was preceded by a lot of work on the service provider side, as all associations and federations operating in the state-owned angling venues had to fill the system with data on the waters, including a short description of the angling venue and photos, the species of fish that can be caught in the venue, the angling regulations and the position of the venue in the map (for private and municipal water managers this was only an option if they wished to enter the system to sell licences). Anglers could then use a search engine to compare the angling opportunities and value for money of the venues, and to find other angling venues in the area where they were on holiday. The services also include an angling examination module, also available here, but only available at the designated examination sites, but one can sign up for an examination date from home by selecting the examination site and practising for the examination. Table 3 summarises the benefits of the system from the provider and consumer side.

Table 3. Benefits of the HORINFO system for operators and anglers (Source: own editing)

Service provider (associations, federations, outlets)	Anglers
<ul style="list-style-type: none"> - Can be used as a business management system - Public registers - Simpler state and regional licencing (online/offline) - Examination surface and register available - Fish guard's application for checks - Managing bans from angling - Total catches of fish - Clearing house - Reports on sales - Internal communication channel 	<ul style="list-style-type: none"> - Purchase of licences unlimited in space and time - Price comparison - Angling venue selection - Examination surface and register available - Catch register

Future development directions also include the sales of additional services aimed specifically at the development of angling tourism, such as accommodation, catering, and the recommendation and booking of angling guides near an angling venue. Angling guides would play a very important role in the development of angling tourism in natural venues. They are

the ones who, knowing the natural waters, could guide anglers to the right angling spots, thus increasing the chances of catching fish, since angling tourists, like tourists in general, want to have as much experience as possible in as little time as possible (Raffay, 2022). On the service provider side, the disadvantages of using the system are higher costs (infrastructure, fees, commissions), aversion to digital systems, lack of signal in some places.

With the launch of the ANGLERS' APP, which will manage all the angling documents and digitally manage the catches, the number of users is expected to increase significantly as the services offered by the system will be expanded and the convenience services will be made more familiar to anglers. Another focus of the research was the development and measurability of specific sustainability monitoring indicators. Using metadata, the visitation of each site was explored. Among the indicators, it will be important to determine the angling capacity of the venues overall and by period (in a daily breakdown). The present study could only show the total number of licence sales in each area, broken down by sales period (annual, weekly, 72-hour and daily/24-hourly). Annual licences can be used on any day of the year, so the actual angling time could not be determined. Firstly, the overall distribution of licences sold across the different angling venues was analysed, which shows the distribution of angling tourism in the different areas of the country. The size of the circles in the figure indicates the number of angling venue licences sold for a given area (Figure 4).

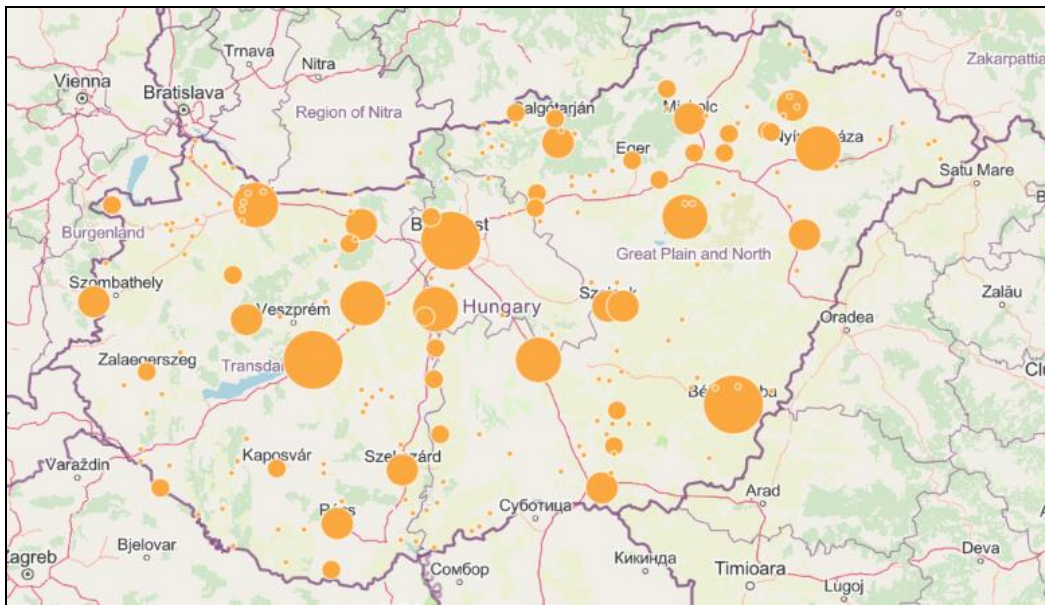


Figure 4. Distribution of angling venue licences sold through HORINFO in Hungary by fishery management right holder (2023) (Source: Dérer et al., 2023)

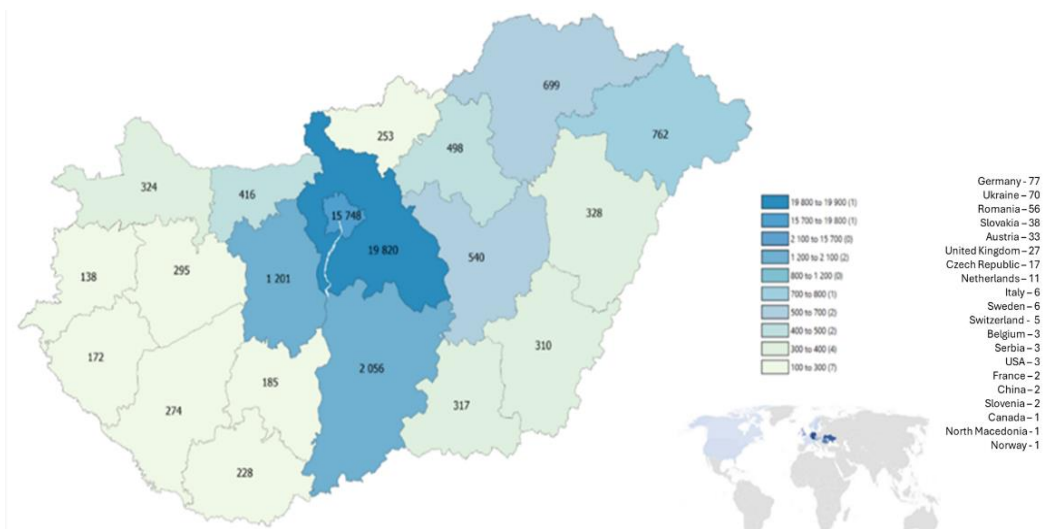


Figure 5. Distribution of angling tourists at the Danube branch of Ráckeve-Soroksár Danube Branch by place of residence (Capita/region) (Source: own editing based on data extracted from HORINFO, 2023)

After analysing the national licence sales, the regional licences issued for each venue were examined. By extracting the individual licences from the system and linking them to the angler's residence based on the angler's ID number, the research allowed the tracking of the anonymous data extracted from the anglers' movements. For the time being, this is only possible in space, as it is currently not possible to determine the exact day of angling for annual licence holders. However, once the Angling App is ready, the movements of anglers will be monitored not only in space but also in time, as anglers will have to

activate location tracking on their phone after logging in, so that the specific days on which they fished can be determined for annual licences. Only a few examples are highlighted from the analyses to illustrate the applicability of digitalisation and indicators. The examples include a natural water: the Ráckeve-Soroksár Danube Branch (Figure 5); the largest reservoir in Hungary, the Tisza Lake on the Tisza River (Figure 6); and a smaller reservoir managed by an association, which has undergone very significant developments in the last decade in terms of angling tourism: the Maconka reservoir (Figure 7).

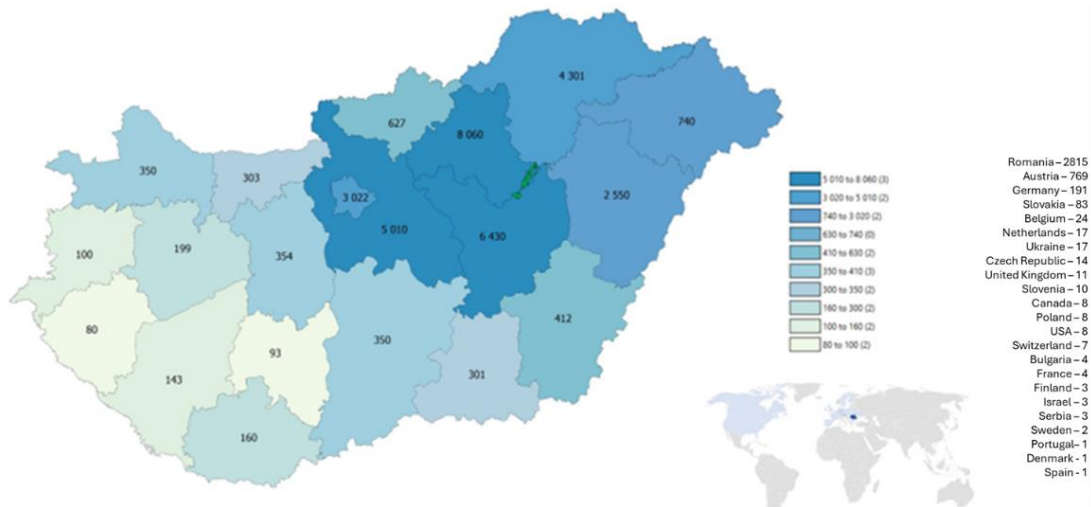


Figure 6. Distribution of angling tourists at Tisza Lake by place of residence (Capita/region) (Source: own editing based on data extracted from HORINFO, 2023)

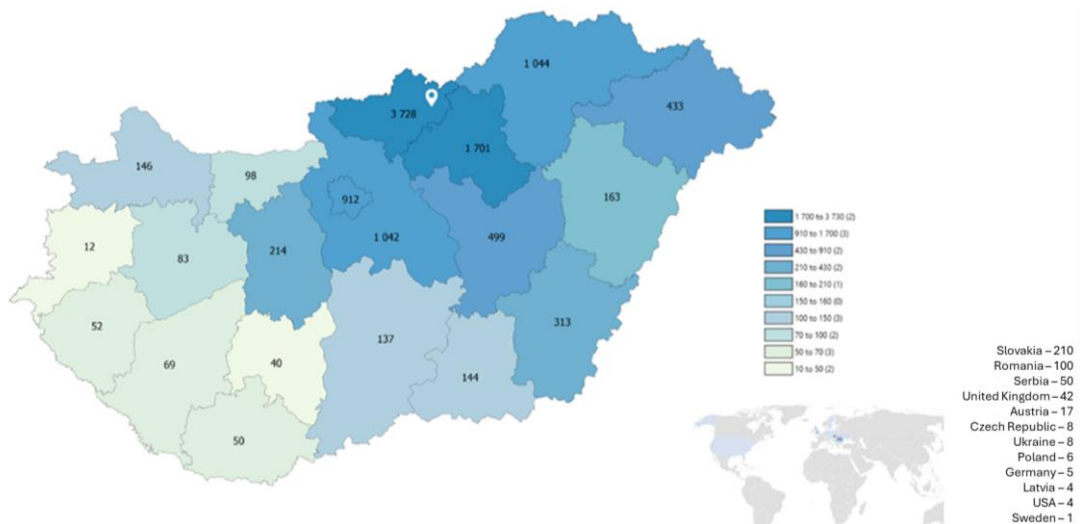


Figure 7. Distribution of angling tourists at Maconka Reservoir by place of residence (Capita/region) (Source: own editing based on data extracted from HORINFO, 2023)

The analysis of the data shows that the number of visits to each angling venue varies and is not necessarily determined by the size of the angling venue. The Ráckeve-Soroksár Danube Branch is mainly a favourite angling spot for people living along the Danube and for those living in Budapest, while Tisza Lake, which is also a popular water tourism destination and therefore nationally known, attracts anglers from a larger catchment area, but the Maconka reservoir, which is half the size of Tisza Lake, has enjoyed similar popularity due to the developments.

CONCLUSION

The essay is a summary of the most important changes in angling tourism in recent years. The authors have presented the current state of digitalisation in angling tourism, its benefits at individual and societal level, and examined the acceptance of new technologies by anglers. The results of the research show that in the period of the Covid-19 epidemic, digitalisation and the introduction of new technologies accelerated, while their adoption in angling tourism has been slower. The study demonstrates the importance of digitalisation in monitoring the environmental pillar of sustainability and the necessary interventions. The completion of digitalisation, and thus the introduction of the Anglers' App together with the digital catch logbook, will show not only the current spatial angling movements, but also their temporality and thus become an important tool for sustainability monitoring. This is of particular importance in protected areas, where the regulation of the number of anglers and the prevention of overtourism is currently not addressed. The HORINFO system currently allows for the possibility to restrict licence sales during certain periods. In the future, it will be possible to set critical values for different water areas to limit the number of anglers during a given period.

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