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PROSPECTS FOR THE RESTORATION OF TOURISM DEVELOPMENT IN UKRAINE IN THE POST-WAR ERA BASED ON THE DIGITAL TRANSFORMATION STRATEGY
ПЕРСПЕКТИВИ ВІДНОВЛЕННЯ РОЗВИТКУ ТУРИЗМУ В УКРАЇНІ В ПІСЛЯВОЄННИЙ ПЕРІОД НА ОСНОВІ СТРАТЕГІЇ ЦИФРОВОЇ ТРАНСФОРМАЦІЇ

Дехтяр Н. А., Перспективи відновлення розвитку туризму в Україні в післявоєнний період на основі стратегії цифрової трансформації. *Український журнал прикладної економіки та техніки*. 2024. Том 9. № 4. С. 192 – 200.

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The article identifies priorities for developing digital tourism products in Ukraine's post-war recovery, emphasizing the need for secure communication between consumers and providers. The prevailing focus on conventional tourism services in current tourism cash flows is set to be complemented by the potential offered by digital infrastructure and virtual tourism, which are identified as promising avenues for innovation and cultural preservation. The restoration of tourism infrastructure should be primarily guided by the prevalence of physical or virtual travel, as indicated by a strategic matrix proposed for assessing recreational potential in de-occupied territories. The issues of post-war zoning of Ukraine are discussed, which typically categorizes areas as unoccupied, liberated, or active conflict zones that are insufficient for local route planning and safety assessments. Recreational cadastres, now essential for ensuring visitor safety, must list suitable areas and facilities with unique identifiers and geographic coordinates mapped digitally. The article proposes a range of tourism types for different territories, emphasizing a strategic approach to recovery predicated on fluctuations in the popularity of diverse tourism products and geographical areas.

Key words: digital tourism, post-war reconstruction, zoning of recreational areas, strategy matrix, directions of tourism development.

Стаття має на меті визначити пріоритети розвитку цифрового туристичного продукту в умовах відновлення туристичного споживання, у тому числі з використанням ресурсів рекреаційних територій, що постраждали від воєнних дій; та обґрунтувати систему комунікації між споживачами та постачальниками туристичних послуг з урахуванням необхідності дотримання заходів фізичної безпеки. Хоча поточні оцінки показують зростання грошових потоків від туризму, вони зосереджені на традиційних послугах, а не на цифровій інфраструктурі. Віртуалізація туризму та створення цифрових послуг є перспективними для розвитку інноваційних рекреаційних продуктів та збереження культурної спадщини. Основним критерієм пріоритетності відновлення туристичної інфраструктури має бути переважання фізичних чи віртуальних подорожей. У статті запропоновано стратегічну матрицю, яка може бути розширена для деокупованих територій з метою оцінки рекреаційного потенціалу для цифровізації туристичного ринку. Повоєнне зонування України зазвичай поділяє території на неокуповані, звільнені та окуповані/зони активного конфлікту. Ця класифікація є корисною для аналізу ЗМІ та ресурсів, але недостатньою для планування місцевих маршрутів та оцінки безпеки. Рекреаційні кадастри, які раніше були обов'язковими для планування туристичних маршрутів, тепер необхідні для забезпечення безпеки відвідувачів. Ці кадастри містять перелік територій та об'єктів, придатних для використання, з унікальними ідентифікаторами та географічними координатами, нанесеними на цифрові карти. Зонування рекреаційних територій має надавати пріоритет безпеці та офіційному дозволу на відвідування. Будь-який нещасний випадок за участю туристів, наприклад, контакт з вибуховими пристроями, значно знизить інвестиційну привабливість України. Нерезиденти часто сприймають країну як монолітне утворення, не розрізняючи регіонів. Відновлення туристичних потоків може зайняти роки, залежно від швидкості відновлення інфраструктури. Повоєнна Україна може приваблювати «чорних» туристів, які цікавляться екстремальними явищами, але цей інтерес, як правило, короткочасний. Початок і кінець конфліктів є найбільш емоційними етапами, що викликають підвищений інтерес. Після піку емоційного напруження увага переключиться на інші події. Україна має бути готовою приймати туристів одразу після закінчення війни, оскільки інтерес до неї буде найвищим. Стратегічний розвиток туризму має враховувати тенденції туристичних запитів та їх часові рамки. У статті також пропонуються можливі види туризму для різних територій, підкреслюється необхідність стратегічного підходу до відновлювального розвитку. Цей підхід має враховувати коливання інтересу до різних видів туризму та локацій, забезпечуючи збалансоване та стале відновлення туристичної галузі України.

Ключові слова: цифровий туризм, повоєнне відновлення, зонування рекреаційних територій, матриця стратегій, напрями туристичного розвитку.

Statement of the problem

Given the complete suspension of inbound leisure tourism to Ukraine, which came into effect in February 2022, tourism market players must identify alternative consumer demand and maintain sales volumes sufficient to ensure profitability. In the context of the crisis, characterized by the dissolution of the integral system of socio-economic ties and the impracticability of secure physical travel across the country, a digital (virtual) tourist space

must be created. This will allow investment to continue flowing into the innovative development of the national tourism industry, ensure the preservation and restoration of destroyed leisure infrastructure and individual facilities and concurrently generate a new competitive product for domestic and foreign markets.

In the context of territorial restoration, scientific literature and strategic documents at various levels of management place significant emphasis on the reconstruction of settlements, the restoration of industrial production, and the revitalization of the natural environment. The following publications are the most noteworthy in this respect, as their authors seek to combine revitalization tasks in several areas. They include the works of A. Hoeffler develops a comprehensive approach to the complex reconstruction of life support infrastructure in African countries and investigates the issue of investments in various sectors of national economies [1]; P. Marsh et al. [2] - the tasks of ecological restoration in ties with the health of the local population; T.S. Pacheco Toma et al. [3] - the development of an algorithm for the restoration and conservation of highly threatened areas; S. Prober et al. [4] - ecological renovation in the context of a changing climate, to build adaptive capacity programs; L.N. Svejkar et al. [5] - the impact of large-scale disturbances on ecosystem restoration; B. Fu et al. [6] - an explanation of the holistic approach of the complex of state ecological restoration strategies implemented in China; Lv et al. [7] - a complex approach to large-scale restoration strategies based on spatial-based zoning. For Ukraine, the strategies for tourism renovation have been outlined in two principal NTO documents: "The analytical research of losses of the tourism industry by the war in Ukraine" [8] and "Revitalisation of the SMEs in the tourism and hospitality industries in 2023-2033" [9], together with smaller, specialized documents issued by the Organisation. However, these documents are more oriented towards the physical industry renovation and the priority of rebuilding local accommodation and recreational facilities than towards the digital tourism market - the last, in our opinion, will be beneficial in complementing "traditional" objects of interest.

The purpose of the research

The purpose of the present article is twofold: first, to determine the priorities for the development of a digital tourism product in the context of recovering tourism consumption, including the use of resources of recreational areas affected by military operations; and second, to create a system of communication between consumers and providers of tourism products, considering the need to comply with physical security measures.

The article's object is the process of creating and implementing a digital tourism product that draws upon the existing potential of the national recreational infrastructure; its subject is the strategic planning of the digital tourism product's creation to ensure the preservation of Ukraine's national tourism potential.

Presentation of the main research material

1. The estimation of the tourism market potential in Ukraine during the hostilities and in a post-war period. As the National Tourism Organization of Ukraine (NTOU) observes, "the termination of customary financial and trade relations, in conjunction with the ambitious aspiration for membership in the European Union, fundamentally transforms the role of Ukraine in the regional and global economy" [10]. The World Bank has conducted a detailed study on the potential contributions of the private sector to Ukraine's ecological and intensive reconstruction, including the prospects for the recovery of the tourism sector. The previous report, dated October 2023, assessed the investment potential for the tourism industry's recovery, and the following main provisions were outlined [11]. The tourism industry possesses considerable potential for development in urban and rural areas across most regions in Ukraine. However, it should be noted that the investment opportunities identified in the report are not related to reconstruction. The invasion of the Russian Federation has resulted in damages to the cultural and tourism sector amounting to 2.6 billion dollars, with reconstruction requirements estimated at 6.9 billion dollars. Cultural assets have suffered the most damage, and the private sector cannot restore them. Before the invasion and discounting the impact of the pandemic in 2020, hotel and lodging operating margins were robust, exceeding 25% in 2019 and -17% in 2021. However, the tourism sector faces challenges in terms of its development, which can be attributed to outdated and dysfunctional regulations, inconsistent policies, and a weak institutional framework at the state level, all of which discourage investment. To facilitate both general and sectoral tourism development, it is essential to implement a comprehensive, systematic, and balanced approach to investment attraction grounded in a clearly defined brand and a cohesive marketing strategy. It is estimated that private investment in this sector amounts to approximately \$5 billion, based on the insights gathered through interviews with senior executives operating within the tourism sector [11].

According to the NTOU, in 2022, the import of services under the "Travel" article increased significantly, which should have been expected given the mass migration from Ukraine since the beginning of hostilities [12]. As of October 2024, official data for 2023-2024 has yet to be released. However, empirical observations suggest that there are return flows of visitors-citizens of Ukraine who are temporary non-residents, staying in various countries under government protection programs against war. On average, these individuals travel back and forth to Ukraine once or twice a year to visit friends and relatives, inspect the condition of their real estate and other property, and then return to their country of temporary residence. In the event of utilizing travel services within Ukraine, according to the guidelines provided by tourism statistics, this constitutes a domestic journey. This is noteworthy given that, despite residing abroad for extended periods (some for over two years), many Ukrainians maintain their citizenship and do not relinquish their links to Ukraine. However, it should be acknowledged that, in practice, this involves crossing the state border and expending funds obtained from external sources, a phenomenon referred to as the "artificial export". When visiting home, temporary non-resident citizens utilize tourist services related to recreation and rest and (to a great extent) the services of specialists to whom they have

limited access abroad or are dissatisfied with the quality. These include dentistry and cosmetology services, which represent most of the demand for beauty industry services. Notably, demand for these services increased during the war years despite high inflation and the subsequent price increase. This is primarily because the cost of these services remains lower than in other countries, and non-residents receiving social benefits, wages, or other income in their country of temporary residence (sometimes combining multiple sources of income) have the financial means to spend on highly elastic services. Such trends have yet to be the focus of sufficient research, primarily due to the absence of appropriate methodologies for collecting data through official statistical observations. However, empirical observations have highlighted these trends. An indirect source of assessment of such flows (formally, they cannot be called touristic, but in essence, they are approaching the category of nostalgic tourism) can be served by the data of carriers - airlines and road transport companies that run to the border with Ukraine. The emergence of numerous new intermediaries within this sector, namely "micro-enterprises", self-employed individuals, and unregistered citizens providing various services for transporting passengers and small cargo within Ukraine and across the border, further complicates the assessment of flows. These individuals can register as private entrepreneurs in their country of temporary residence and pay taxes there. However, in Ukraine, they are not included in the reporting of commercial transactions, making the scope of their activities, despite agreements on avoiding double taxation, currently impossible to estimate. While demonstrating the growth of cash flows in tourism and associated industries, the summary focuses predominantly on conventional tourism services that do not involve digital infrastructure.

2. The matrix of tourism renovation strategies based on the recreational areas zoning. In the context of the "real" export of tourist services, the virtualization of tourism and the creation of digital tourist services represent one of the most promising avenues for developing innovative recreational products. This, in turn, will facilitate the preservation and restoration of destroyed national cultural heritage. The predominance of physical or virtual trips best determines the classification of regions prioritizing restoring the tourist infrastructure. A preliminary classification system is proposed as a strategic matrix (Figure 1).

The degree of the region destruction (horizontal axis) / Availability of digitalization potential (vertical axis)	The hostilities are still ongoing, the inability to conduct any recreational activities	De-occupied territory with significant consequences of destruction	The de-occupied territory, which was almost unaffected by the hostilities and where the tourist infrastructure has been preserved	Territory on which no combat operations were conducted
Recreational resources have not been digitized, no digitization project was implemented, and potential in the field of intangible heritage has not been determined	Priority №1 (efforts to preserve those digital tourism resources that can still be restored)	Priority №1 (efforts to preserve those digital tourism resources that can still be restored)	Priority №3 (the territory must be checked for the safety of the physical presence of visitors, a work can be provided simultaneously on restoring physical and creating virtual trips)	Priority №4 (normal development strategies are in place, more attention should be paid to the creation of virtual recreational resources)
The territory contains elements of intangible cultural heritage and existing recreational resources, but large-scale digitization projects have not been implemented	Priority №1 (efforts to preserve those digital tourism resources that can still be restored)	Priority №2 (add to existing databases and develop new virtual routes based on current projects)	Priority №3 (the territory must be checked for the safety of the physical presence of visitors, a work can be provided simultaneously on restoring physical and creating virtual trips)	Priority №4 (normal development strategies are in place, more attention should be paid to the creation of virtual recreational resources)
Some of the recreational resources are already digitized, the experience of digitization at the level of individual projects and clusters, the territory is rich in intangible heritage and modern events	Priority №2 (add to existing databases and develop new virtual routes based on current projects)	Priority №2 (add to existing databases and develop new virtual routes based on current projects)	Priority №3 (the territory must be checked for the safety of the physical presence of visitors, a work can be provided simultaneously on restoring physical and creating virtual trips)	Priority №1 (normal development strategies are in place, export of digital tourism products should be stimulated)

Figure 1. Matrix of strategies for restoring the tourism potential of regions of Ukraine affected by military actions

In the subsequent paragraphs, the necessity for expanding this matrix will be discussed, with reference to the classification of de-occupied territories. However, it can be used at the initial stage of assessing the preserved recreational potential for digitalization.

While the utilization of recreational cadastres for planning tourist routes or the general evaluation of the appeal of specific administrative units was previously advantageous but not imperative, the current context necessitates an exclusive list of individuals (point) objects and closed locations and routes to them. This list will be incorporated into the travel plan by tourist operators, developers of a complex of services, intermediary agents, and individual (independent) tourists. It will be made generally available to the public as a safe area for visiting. A recreation cadastre is a register of territories and objects designated as suitable and permitted by the relevant state or local government for commercial, non-commercial, communal, or community use. These objects are assigned a unique identifier, typically a code or serial number, accompanied by a concise description and precise geographic coordinates. In certain instances, this may be an address and/or a point coordinate, particularly in the case of a polygonal or linear object, where a set of geographic coordinates is employed. During the digitization

process, these coordinates are read by the application, and the point/boundaries of the object are plotted as a separate layer on the base map (substrate or base layer).

Publications addressing the subject of post-war zoning of the territory of Ukraine typically differentiate three categories: 1) territories that were not occupied; 2) those that were under occupation but were liberated; 3) those that are occupied and/or on which hostilities are conducted. This classification provides a rudimentary overview of the contemporary situation in the media and a generalized analysis of resource requirements for recovery purposes. However, it falls short in addressing the needs of local route planning and determining the status of specific sections of land or water bodies for safe people-to-people interactions. It is imperative that recreational zoning of the entire territory of the country is carried out by the only main criterion of safety of free stay and movement in this location, as well as official permission to visit. The subsequent categorization may encompass a multitude of additional factors; however, after the initial incident (i.e., death or injury of tourists) associated with, for instance, contact with an explosive device, the investment attractiveness of the nation will undergo a substantial decline. This phenomenon will also influence the perception of Ukrainian regions that hostilities have not impacted. Empirical evidence demonstrates that non-residents, particularly those from other regions, initially perceive the country as a unified entity (sometimes limited to a specific city or tourist destination yet perceived as monolithic in the foreigner's imagination). This perception does not differentiate among geographical, ethnocultural, or demographic variations. In the event of natural or man-made disasters (as exemplified by the 2011 tsunami in Thailand), individuals often abandon their vacation plans and opt for alternative, more secure countries, even though these disasters may not directly impact neighboring regions within the country or cross-border zones. The restoration of pre-disaster levels of tourist flows can be expected to take months or even years, contingent on the rate of reconstruction of recreational infrastructure. A further factor is the influx of so-called "black" tourists, who are attracted to observe extreme phenomena. These tourists tend to be one-time or short-lived and small. Conversely, in the context of the post-war recovery of Ukraine, the resurgence of interest in the country that witnessed the onset of the Third World War could prove pivotal in the gradual restoration of conventional tourism. However, it is crucial to acknowledge the rapid dissipation of interest in events that have lost their emotional resonance. The initial and concluding phases of the conflict are the most emotionally charged periods, during which interest in the country (which is short-lived) is observed to increase, with the assistance of the mass media. After the peak of emotional stress ("surge"), the attention of the information user is redirected to other areas or objects, which in turn should evoke a similar level of emotional response. Notably, such a transition in attention occurs on a scale of intensity, not polarity. This suggests that news or events should simply leave a strong impression, irrespective of their polarity. It is particularly advantageous if these events represent opposite ends of the emotional spectrum, maximizing the user's exposure to diverse sensations. Consequently, Ukraine should be prepared to receive tourists immediately following the cessation of hostilities; at this point, the country's appeal will be at its zenith, as opposed to after a protracted recovery period. In formulating strategies for rehabilitating the tourism industry, it is imperative to consider the fluctuating trends in the formation of requests for diverse forms of tourism and geographical locations and their temporal relationship. Table 1 provides a comprehensive overview of the recommended tourism types for implementation in various territorial contexts.

Table 1. Prospective types of tourism with a physical presence in regenerating territories

Territory status	Types of tourism soon	Efficiency of economic use (profitability for the national economy)	Estimated recovery time, years
1) destroyed territories	Scientific, military, diplomatic - mainly remote observation	low	> 50
2) "buffer zones" that bordered the front line	Scientific, military	low	30-50
3) locations for conducting military exercises and storing equipment	Military, diplomatic	high	2-5
4) industrial complex enterprises and dual-purpose objects	Scientific, military, diplomatic	high	2-5
5) natural habitats in need of restoration	Scientific, ecological	low	20-30
6) agricultural land	Scientific, ecological, rural	high	10-20
7) disposal of water resources and coastal areas	Scientific, ecological	low	> 50
8) border areas	Military, diplomatic	low	30-40
9) "exclusion zones"	Scientific, military - mainly remote observation	average	> 50

Source: made by the author

The necessity for a comprehensive categorization of territories emerges in response to the proliferation of diverse locations, which, regrettably, for a considerable duration, will be excluded (and should be disregarded from the perspective of security imperatives) from conventional tourist itineraries. The following list comprises, but is not limited to, locations that had a normal status prior to the commencement of hostilities:

1) destroyed settlements and natural habitats must be cleaned and revitalized before reconstruction and restoration. These areas are characterized by intense combat, resulting in significant destruction and a high density of unexploded ordnance (UXO) and projectiles, which have posed a considerable threat to the civilian population for decades;

2) "buffer zones" that bordered the front line – these areas are not as destroyed as the previous ones. However, due to the deployment of troops, they also pose a danger due to the high probability of abandoned combat shells, equipment, minefields, IEDs, and built fortifications, such as trenches and observation posts, which were often hastily erected and constantly rebuilt. Such territories have the potential to transition multiple times within a short period, shifting from one side of the conflict to the other. Consequently, these areas contain evidence of the activities of subversive groups, which pose a significant threat to the civilian population;

3) locations for conducting military exercises and storing equipment: to the old facilities that will remain or will be relocated, many new ones will be added, including small ones, because the strategy of concentrating large stocks of military equipment and the operation of large-scale training grounds and training centers in relatively a small number of locations led to targeted point attacks and the destruction of a large number of stocks, which the country's military leadership will try to avoid in the future;

4) industrial enterprises and research centers of the military-industrial complex and dual-purpose objects, including the territory where production facilities are directly located and test sites and training grounds. Ukraine has emerged as a global leader in developing and utilizing military and modified civilian unmanned aerial systems and devices ("drones"). This distinction is particularly salient in the context of most European NATO member countries' inability to allocate air (and, consequently, ground) space for testing models employed in tactical operations. This is especially relevant for countries with a small territory and dense urban development and countries with a predominance of mountainous terrain. In the case of the latter, high-mountain areas with rough terrain are ideal for the final stages of testing uncrewed vehicles (reliability of navigation systems, endurance in difficult natural conditions, etc.). However, they are unsuitable for the initial training and use of mass-budget UAVs (uncrewed aerial vehicles). The same is true of remote, rugged terrain with complex grounds, which is unsuitable for initial testing of devices where navigation and data transmission systems are key functions, as they usually do not have reliable satellite and mobile coverage. Ukraine has significant advantages in this regard, and for testing unmanned systems and means of countering them, destroyed and relatively dangerous (not cleared of UXO and scrap) territories can be used;

5) natural habitats that were not as severely affected as Zone 1 but will not withstand a high recreational load - for example, forests and forest strips where military equipment and personnel were located. In order to restore such natural habitats, it would be desirable to limit the number of visitors for the first few years until the vegetation has been restored. Creating new habitats, such as artificial forest plantations, is also a recommended course of action. This is particularly pertinent given the near-total destruction of forest cover in combat zones and adjacent territories;

6) agricultural lands: those that will be restored after damage or newly created to compensate for the loss of land in the occupied territories;

7) disposal of water resources and coastal areas. In the eastern regions of Ukraine, the incessant bombardment has led to the disappearance of groundwater, including that which is found at great depths. This will not only threaten food security due to a decrease in supplies of high-quality drinking water but will also lead to a decrease in balneological treatment resources because some of the destroyed sources contained supplies of table and therapeutic mineral waters. In the southern regions of Ukraine, the coastline will be partially closed to visitors due to the risk of sea mines and barricades erected to deter enemy landings. Consequently, there will be an increased demand for seawater swimming pools, which will likely be divided into two categories: those owned by hotels and privately owned, and those for public use. 8) Wide strips of territory along the northern and eastern borders, where hostilities could not be conducted but which were equipped;

9) "exclusion zones" - preserved territories with prohibited access, which cannot be restored with the available modern technologies or whose restoration is economically impractical. These zones can encompass areas of significant destruction (category 1) and those that remain primarily undisturbed (forests, coastal strips, and water basins), likely to contain a high concentration of hazardous devices or substances. Examples include warning minefields, former long-term enemy strongholds, and even abandoned urban buildings and neighborhoods, which may contain installed mine traps. Furthermore, it is important to note that this may also include areas that may be re-attacked by the enemy after the hot phase of the war is over.

As outlined in the table, the implementation of specific tourism types will be overseen by military departments and civil protection services. It is important to note that the export of these services has the potential to contribute a substantial share of income to the state budget. For instance, at locations categorized as 3, 4, and 8, it is recommended to undertake training for Ukrainian and allied armed forces. In locations classified as 1, 2, and 7, however, there is potential to lease airspace for the training of UAV operators and the testing of robotics and military equipment for demining, among other applications. In buffer zones, which are relatively safe areas as determined by a preliminary survey, installing equipment for power plants that will produce alternative energy sources is permitted. The construction project of low-power nuclear power plants can be considered in the exclusion zones, provided that safe personnel approaches are definitively established. However, the viability of the latter proposal remains uncertain and necessitates meticulous, analytical calculations, given the proximity of newly designated exclusion zones to the border of the enemy state. The lands classified under categories 6 and 5 present potential for experimentation with diverse technologies aimed at restoring the natural environment, as well as for the execution of ecological projects and the testing of agricultural robotics. It is crucial to recognize that approximately one-third of the territory of Ukraine should be considered a priori dangerous for the civilian population without preliminary survey and demining. Consequently, it is necessary to consider the strategy for

developing robotics in various branches of the national economy (in addition to military programs) and the corresponding advanced training of specialists. Another potential niche market to explore is educational tourism in this field, given that few countries worldwide possess the necessary scientific potential to facilitate applied and theoretical developments.

3. Using online mapping as a prior framework for the security of travel. The online maps of the Deep State project [13] illustrate the scale of the military operations and can be used as a basis for further construction of the recreational inventory. However, even an experienced tourism specialist cannot independently determine the boundaries of all buffer zones and dangerous and/or prohibited locations. Interaction with authorized military departments and civil defense services with all topographical information is required. Virtual tourism applications integrated with an accurate map of the area (for example, reconstructed three-dimensional models of destroyed cultural heritage) should contain a disclaimer about the inadmissibility of independent visits to territories recognized as dangerous, even if combat operations were not directly conducted on their territory. Figure 2 demonstrates an example of zoning territories and creating a multilayer online map (Deep State Map is a mobile Android and iPhone application).

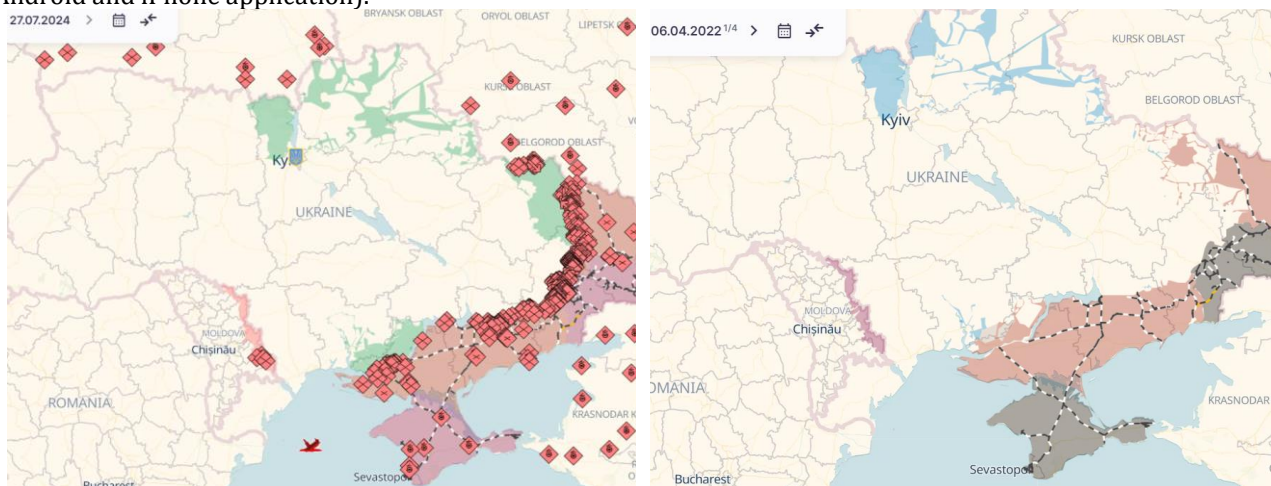


Figure 2. The areas of Ukraine that are dangerous to visit based on DeepStateMap [13]

In typical user mode, it is possible to sum up the areas of spatial polygons (which are a separate layer above the base map) and get approximate results for each administrative unit. If you access the data tables of the interactive map, the calculations will be more accurate; you can divide the polygon into the required number of sections and work with spatial data as with ordinary numbers. Polygons in DeepStateMap were created depending on the time of military operations. Therefore, their borders are not tied to the borders of administrative units (at least in the publicly available version). The task of the online map was to inform the population about the current situation and identify the most dangerous areas. In addition, in 2015-2020, administrative-territorial reform was carried out in Ukraine, and if the boundaries of regions, that is, the coordinates and location of basic polygons (the first level of territory division) did not change, then the boundaries of districts and territorial communities underwent significant changes. This means that for maps created before and during this period, data needs to be recalculated, and new ones need to obtain the most recent version of the underlying geospatial information. After the end of hostilities, the administrative-territorial division will be revised several times because many small settlements have been destroyed, and therefore, it may not make sense to allocate a separate territorial community that existed in this area until March 2022. Any change in coordinates and, accordingly, the area and boundaries of polygons require revision of map layers. The user may not notice the difference at all if the information is aggregated and displayed within the regions, but the developer needs to, in fact, "redraw" the entire map.

As Figure 3 shows, in 2024, almost all the occupied territories of the Kharkiv region are liberated, but, returning to the maps of 2022-2023, we understand that the zones marked on today's map as de-occupied (green color) are hazardous to visit independently, for example, locations around the Pechenegy reservoir, which was one of the most popular regional recreation centers before the war. From time to time, there are reports in the mass media about the injuries of civilians due to UXO. With the repeated offensive in the north of the region - the opening of the so-called "Kharkiv direction" of the front in two centers (in the vicinity of the village of Hlyboke and the city of Vovchansk), the profoundly unoccupied and de-occupied territories became theoretically dangerous zones within a radius of several tens of kilometers - depending on the range characteristics of artillery fire systems to be taken as a basis.

Thus, the developers of tourist routes and independent tourists need to travel on the territory of Ukraine, firstly, to provide access to timely updated and understandable information for the average user about the status of the location, especially at the intersection of territories of different categories, and secondly, the ability to use such information and the availability of cross-platform applications that connect to the central navigation systems and (ideally) contain a dead reckoning module. Regarding the latter, the error in the accuracy of determining the location point on the online map using standard GPS technology varies within several meters, or the signal from the satellite may be interrupted or overlapped by nearby objects/terrain, which is critical for relative security zones. For example, an agricultural field cleared of explosive devices will border a forest plantation that has not yet been surveyed by sappers or is a fenced exclusion zone. If a tourist unfamiliar with the area incorrectly

determines the boundaries of the buffer zone between them or confuses the bridgeway, this mistake can cost him his life. Therefore, GIS applications must be integrated with topographic maps of the area in the form of vector or raster images, which are superimposed on the online map with the help of additional landmarks. These landmarks can be mini-transmitting stations that send a unique code signal that specifies satellite coordinates, or, in the simplest version, they are plates with a unique identifier that corresponds to an identifier on a printed or digitized topographic map. Such maps and applications should be distributed without restrictions on the population's and foreign visitors' safety. However, it is mandatory to register each user with valid information about citizenship and the minimum personal information necessary for rescuers to find a person in the event of an accident. Software developers have the additional task of ensuring personal data protection in such applications and their integration with applications that civil protection services will use. De-personalized aggregated information on travelers' travel destinations will be helpful to travel companies and relevant local tourism management departments, which will have rapidly updated data on tourist flows. Based on the concentration of visitors, it will be possible to determine the most popular locations and adjust the following strategies for developing tourist destinations according to the market needs.

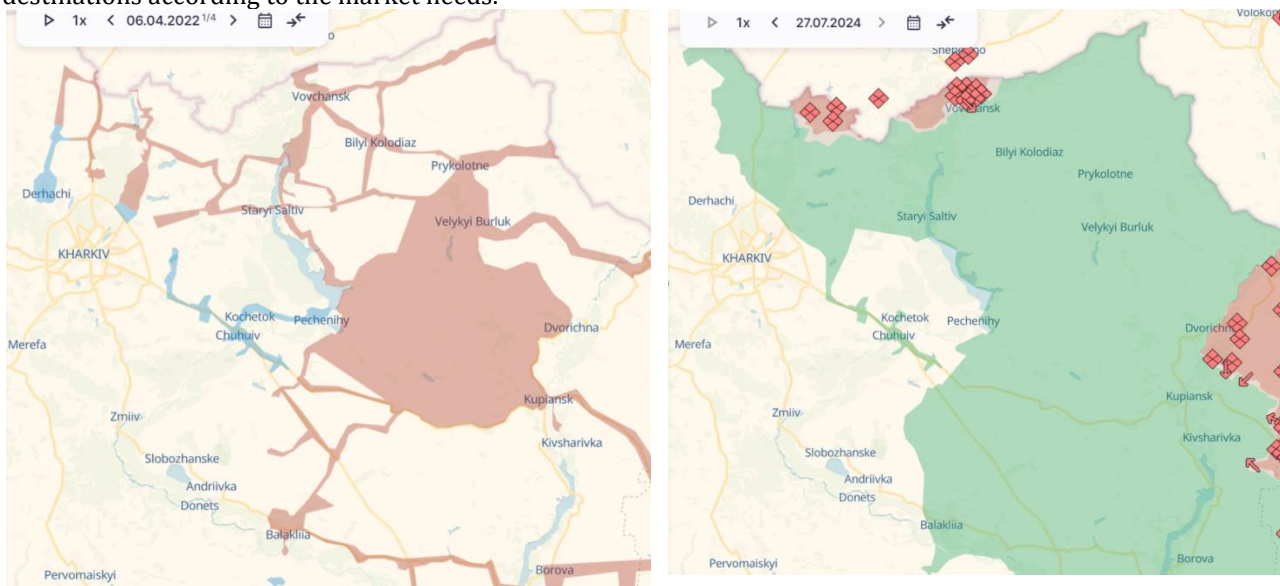


Figure 3. The area of danger for visiting territories of the Kharkiv region [13]

Forced changes will occur in the psychology of travel perception. Since in relatively safe areas for the safety of the civilian population, it is necessary to limit movement to locations outside designated settlements and designated recreation areas, urban tourism and tourism with limited travel routes will become a higher priority in the minds of consumers than independent exploration of wild spaces. This will apply to adventure tourism as well as ecological and rural tourism. Residents of large cities, which are located near the former front line, will feel additionally limited in the geography of movement. On the one hand, this will be negatively perceived as artificial restrictions after the era of globalization and open borders (which ended in early 2020 due to the pandemic); on the other hand, it will give impetus to the development of the local recreational infrastructure of cities, which will have to adapt to the needs of the most diverse segments of the population. However, in the case of a pandemic, violating the ban on physical movement was not so critical. In that case, the probability of a fatal case of trespassing within a dangerous zone affected by hostilities is much higher. A completely new culture of domestic tourism product consumption will be formed in Ukraine, where the primary criterion will be physical safety for life and health. For citizens of Ukraine who have felt the threats of wartime, such a concept of consumption will be natural, while foreign visitors must be constantly reminded and warned about it. Unfortunately, there are not many safe territories left in Ukraine because of constant air strikes using various attack systems, the activities of sabotage groups, and the redeployment of military equipment do not guarantee absolute safety, even in the territories in the deep rear.

Therefore, strategizing the restorative development of tourism in Ukraine for a period of up to 50 years (such a significant period is determined given the survey duration and revitalization programs of the territories affected by hostilities, although the most important stages must be completed in the next 5-10 years) will include four stages:

- 1) Implement virtual tours and other types of digital tourism using digital marketing technologies and approve the ethics of digital consumption. It should start using the available intellectual capital in IT because Ukraine has many IT specialists and enthusiasts ready to join this field. The task of this stage is the digitization and organization of as many materials as possible of the historical, cultural, and modern ethnic-social heritage, which was destroyed, is under threat of destruction, or, on the contrary, received an additional impetus for development due to the presentation of Ukraine in the world as a civilized, progressive state. The virtual tours developed at this stage will create the basis for the further formation of the recreational cadastre of already physical objects of the real world. They will support the positive image of Ukraine in the world.

2) Assessing the state of pollution of the territories, selecting the most economically effective recovery strategy, and approving the classification of depressed regions, considering the postulates of a cyclical economy. Immediately after the end of the war, it is necessary to determine which territories will be prioritized for reconstruction and to develop mutually agreed strategies for the revitalization of natural habitats, the reconstruction of cities, and the creation of enterprises of a new format that will meet the needs of reconstruction and attract investments, including for innovative activities. It is recommended that a plan be created for the placement of productive forces in depressed areas to restore business activity in all regions of the country gradually.

3) A comparative analysis of strategies and stochastic processes that took place in the countries on whose territory hostilities; An ongoing process that reinforces stages 1 and 2. In the 20th and 21st centuries, there were many local conflicts, but almost every country managed to restore its economic and recreational potential, at least partially. Creating a national think tank or a network of similar research centers will allow for analysis of the experiences and mistakes of states that have experienced wars and natural disasters in their territory, and the recommendations received will be used as a basis for national and local strategies. The analysis of the potential of international cooperation requires special attention because a significant part of the population of Ukraine is abroad, and even if it does not return to the Motherland in the coming years, it can provide invaluable experience and contribute to the establishment of economic ties in the countries of its stay. It is also necessary to constantly monitor the sources of hybrid threats because the aggressor country will not stop trying to undermine the integrity of our country in the future and implement basic measures for the security of the digital space in all state strategies.

4) The amount of resources is calculated, and predictive models of alternative development options are built. After preliminary calculations in stage 2 come operational and tactical planning for the practical implementation of recovery strategies. Determining the scope of work and reference points for projects of different durations is necessary. For each territory (their boundaries may not coincide with the boundaries of administrative units), it is necessary to approve a detailed plan of activities for the next 5-10 years and a vision for developing its economic potential for the next few decades. The strategies of ultra-long-term planning are relevant, first, for the most destroyed territories, which are unprofitable and dangerous to include in economic circulation immediately after the cessation of hostilities. In any case, provision should be made for the conservation costs of the "exclusion zones" and when their status will be reviewed.

Conclusions and prospects for further research

Notwithstanding the ongoing hostilities, the investment potential for the recovery of Ukraine's tourism industry is estimated to be favorable, with considerable opportunities for development in both urban and rural areas across the country. However, it should be noted that these investment opportunities are not exclusively focused on reconstruction. The Russian invasion has caused substantial damage to the cultural and tourism sectors, with estimated losses reaching \$2.6 billion and reconstruction needs amounting to \$6.9 billion. Cultural assets have been particularly affected, and the private sector's capacity to restore these assets is limited.

Prior to the invasion and the pandemic shock in 2020, Ukraine's tourism and hospitality industry demonstrated robust performance. However, in order to attract investment in the present circumstances, a comprehensive, systematic, and balanced approach is required, including a well-defined brand and a coherent marketing strategy in the digital tourism sector.

In 2022, the import of services under the "Travel" category increased significantly due to mass migration from Ukraine since the beginning of hostilities. Empirical observations for 2023-2024 indicate return flows of Ukrainian citizens who are temporary non-residents staying in various countries under government protection programs. These individuals often travel back to Ukraine to visit friends and relatives, inspect their property, and utilize services such as dentistry and cosmetology, which are more economical in Ukraine than in other countries. Although not fully captured in official statistics, this phenomenon underscores the significant role of "nostalgic tourism" in shaping these patterns.

The virtualization of tourism and the development of digital tourist services are identified as potential avenues for creating innovative recreational products and preserving Ukraine's cultural heritage. The classification of regions based on the predominance of physical or virtual trips is proposed as a strategic approach to prioritize restoring tourist infrastructure. The proposed recreational zoning framework should prioritize safety measures, including the facilitation of unobstructed movement and the assurance of official permission for visits, thereby ensuring the security and well-being of tourists as they explore Ukraine's attractions. This approach is crucial for maintaining the country's investment attractiveness and ensuring the safety of visitors.

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