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Mapping and Assessment of Intangible Cultural Heritage and Its Effect on Tourism in Sulaimani Province Using GIS-MCDA

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Abstract:

This study provides a comprehensive spatial assessment of intangible cultural heritage (ICH), across the 12 districts of Sulaimani Province in the Kurdistan Region of Iraq. Utilizing Geographic Information System (GIS) integrated with Multi-Criteria Decision Analysis (MCDA) and the Analytical Network Process (ANP), the research successfully identifies and classifies the ICH tourism potential of each district.

The evaluation process began with the systematic collection and organization of data into ten key ICH-related criteria, including annual festivals and celebrations, religious reflections, arts and music, traditional food and drink, traditional clothing and cosmetics, and craftsmanship. These criteria were transformed into spatial datasets and processed into raster format to enable advanced spatial modeling. Fuzzy logic and ANP weighting were then applied to ensure consistency, standardization, and scientific rigor in measuring the significance of each criterion.

The findings revealed that Sulaimani Center holds the highest potential for ICH tourism, scoring exceptionally well across nearly all criteria, particularly in areas such as festivals, religious practices, and traditional arts. Ranya, Chamchamal, and Pshdar also demonstrated strong ICH presence, suggesting these districts are well-suited for focused cultural tourism development. In contrast, districts such as Mawat, Saidsadiq, Qaradagh, and Sharazur showed the lowest ICH potential, highlighting the need for further heritage documentation, preservation, and development in these areas.

This study contributes to the field of sustainable tourism planning by providing a detailed, data-driven approach to identifying and preserving cultural heritage. By pinpointing areas of high ICH value and potential, it lays the groundwork for informed policy-making and heritage conservation strategies in Sulaimani Province.

1. Introduction:

Tourism is one of the biggest and fastest-growing industries in the world. According to the United Nations World Tourism Organization (UNWTO), (Kadiu, 2024) about 1.3 billion people traveled internationally in 2023. These travelers spent around $1.4 trillion USD, helping many businesses like hotels, restaurants, and transportation services (Kilili et al.). Tourism plays a big role in the global economy. It makes up about 10% of the world's total income, when all related jobs and services are included. It also supports over 300 million jobs worldwide, which means 1 in every 10 jobs is connected to tourism (Januszewska et al., 2015).

In many countries, especially in developing areas, tourism brings in important income and supports local communities. It also helps people from different countries and cultures connect and learn from each other (Tola et al., 2024). Countries' efforts are focused on identifying their tourism potential, which is generally categorized into tourism potential, available facilities and services, the hospitality level of tourist areas, and the country's cultural heritage (Rizaldi et al., 2024).

Heritage reflects the past, shapes identity, and forms the foundation for future cultural continuity. It is generally divided into two categories: tangible heritage, such as historical monuments, architectural sites, and artifacts, and ICH, which includes living cultural expressions like traditions, languages, performing arts, rituals, crafts, oral histories, and social customs. Together, these elements form the core of human civilization and provide insight into how societies have evolved (Innocente et al., 2024).

This research focuses on ICH in the Sulaimani province. ICH encompasses living expressions, practices, and knowledge passed down through generations within communities. It includes skills, techniques, and traditions that communities, groups, or individuals recognize as part of their cultural heritage.

Historically, civilizations have flourished where culture was preserved, practiced, and passed on. In places like Mesopotamia, the cradle of ancient cultures, heritage was not merely a static memory, but a dynamic force shaping daily life. In the Kurdistan Region of Iraq, particularly in Sulaimani province, cultural richness has been maintained despite decades of conflict and modernization. The region has retained unique and vibrant intangible traditions seasonal festivals, religious and social rituals, traditional music and dance (like the Kurdish *halparke*), oral storytelling, proverbs, culinary traditions, and artisanal knowledge (MARANGON). These practices embody the soul of Kurdish cultural identity and form a bridge between generations.

However, much of this intangible heritage remains vulnerable, as modern life, migration, generational shifts, and a lack of documentation erode these traditions. Without proactive preservation and integration into policy and development plans, these treasures risk being forgotten (TK, 2024). Many regions across the world have shown that intangible cultural heritage can be a powerful driver for tourism when properly recognized and promoted.

Today, many tourists are looking for more than just sightseeing—they want real and meaningful cultural experiences. This has made ICH an important part of tourism. Instead of only visiting museums or historical sites, travelers are now interested in joining traditional festivals, watching local rituals, tasting local foods, and learning about everyday life in a community (Kambanor & Muralidharan, 2025).

This change has made ICH a valuable tourism resource. When it is included in tourism plans, it helps attract more visitors, improves their overall experience, and supports the local economy. This is especially true in places like Sulaimani, which have a rich but not fully developed cultural heritage (Tan et al., 2024). By highlighting and protecting ICH, regions can create unique tourism experiences that benefit both visitors and local communities.

Using GIS to study the spatial distribution of ICH and its tourism potential evaluation has become a new perspective (Chang et al., 2023; Wang & Zhan, 2022). GIS and MCDA are distinct but closely related fields. Often they provide a powerful framework for making informed decisions in spatial and geographic contexts (Pourmoradian et al., 2021). GIS is a technology that deals with the capture, storage, analysis, and visualization of spatial data. It enables geographic information, such as maps, satellite imagery, and geospatial data, to be used to understand and analyze real-world phenomena in their spatial and temporal contexts (Bipu, 2019). MCDA is a decision-making methodology used to evaluate and compare multiple alternatives based on multiple criteria or objectives (Beaudrie et al., 2021). GIS- MCDA leads to provide the functionality for management of collecting, analyzing, separating, and using data to create ICH maps. Several early papers also utilize GIS-MCDA for assessing and mapping tourism, highlighting its potential for conducting such studies, such as (Chaudhary et al., 2022; Fadafan et al., 2022; Ghorbanzadeh et al., 2019; Gigović et al., 2016; Mohammed et al., 2023; Pourmoradian et al., 2021; Valánszki & Abualhagag, 2022). Integration of GIS and MCDA is a powerful approach for making spatially informed decisions (Mohammed et al., 2023). It helps decision-makers consider not only multiple criteria and objectives but also their geographic context and spatial relationships, leading to more robust and effective decision-making in fields like tourism, urban planning, environmental management, and resource allocation (Mohamadzadeh et al., 2020). This approach can be very effective for achieving the objectives of our study, and it requires the next steps.

This study holds significance in its examination and assessment of the potential of ICH in the Sulaimani and its repercussions on the tourism industry. Addressing research gaps is imperative, encompassing the absence of studies and information on ICH capacity, the lack of a comprehensive database on ICH elements, the dearth of scientific maps, and the deficiency in the analysis and evaluation of ICH status. Notably, there is currently no established guideline on ICH in Sulaimani tailored for tourists. Our research framework is constructed upon the defined research objectives and inquiries. The primary aim of this study is to scrutinize the influence of ICH on the sustainable development of tourism in Sulaimani. Additionally, we seek to identify, evaluate, and engage in discussions regarding the ICH areas that garner the highest ranking, as well as those with the opposite status within the ICH spectrum. The research developed two major research questions, including: a) “What are the capacities of ICH in Sulaimani and their significance for sustainable tourism development?" and b) “Can sustainable development in the tourism sector be achieved through the capabilities of ICH?"

2. Case study

This part addresses two principal themes. Firstly, it explores the geographical and astronomical location of Sulaimani Province, providing a concise overview of the province’s natural conditions. Secondly, it examines the province’s wealth of intangible cultural heritage, emphasizing the enduring legacy preserved across generations and the significance of its transmission to future descendants.

2.1location and geographical nature

Sulaimani Province is one of the provinces of the Kurdistan Region of Iraq, located in the eastern part of both the Kurdistan Region and Iraq (Figure 1).

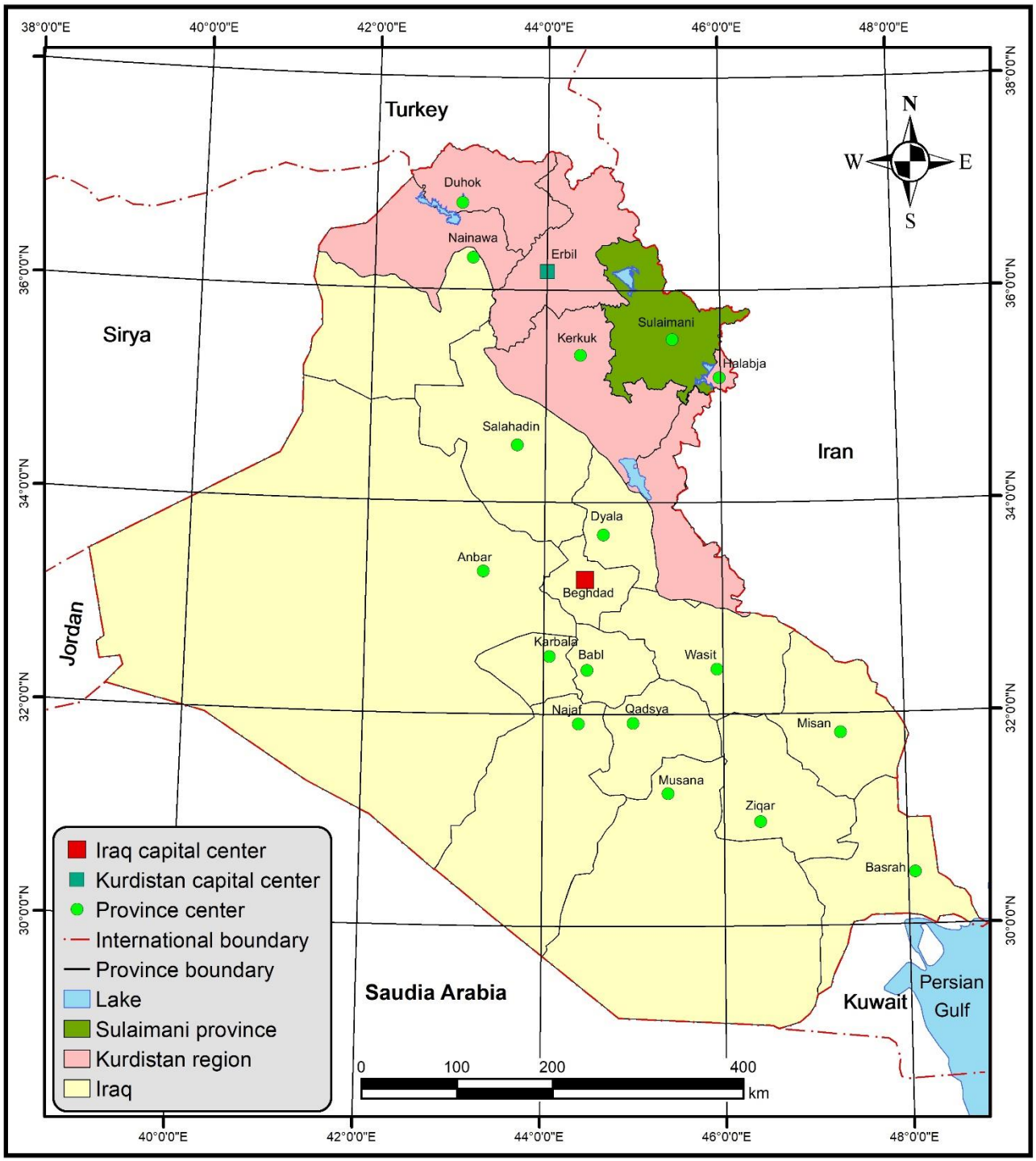

Figure 1, Location of the study area in the Kurdistan Region and Iraq

Astronomically, it lies between 34°55'15" and 36°30'06" north latitude, and between 44°33'40" and 46°20'48" east longitude. The region covers an area of 13,984 km² and consists of 12 districts. It also shares a long border with Iran, extending approximately 297 km (Figure 2).

Topographically, the lowest point of Sulaimani Province is 298 meters above sea level, while the highest point reaches 3,112 meters above sea level. The climate is characterized as Mediterranean, with cold, rainy winters and hot, dry summers. In January, the average minimum temperature is 5.38°C, and in July, the average maximum temperature is 30.34°C. The average annual rainfall in the region is 630.7 mm (Statistical, 2022).

The area is rich in water resources, featuring numerous rivers, lakes, and dams, which are also key attractions for tourists. Additionally, the region boasts many open spaces, forests, and picturesque landscapes, contributing to its significance as a major tourism destination.

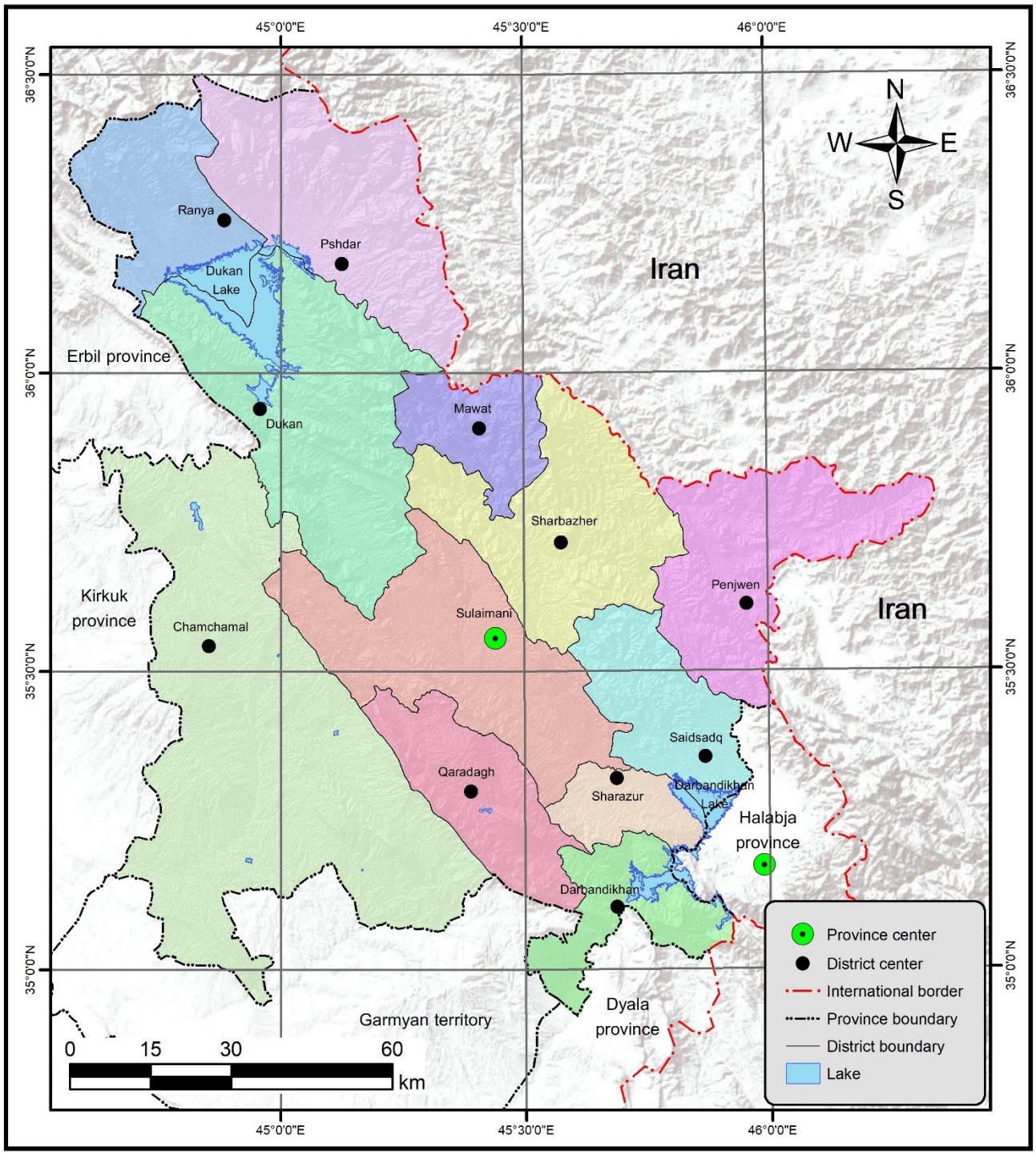

Figure 2, Astronomical Location of the Study Area

In 2019, the population of Sulaimani Province was 1,981,052, with 82.93% living in urban areas and 17.07% in rural areas (Statistical, 2022).

2.2Cultural Capital of Kurdistan and Cradle of Intangible Heritage

Sulaimani, founded in 1784 by Kurdish prince Ibrahim Pasha Baban, has long stood as a beacon of Kurdish culture, intellectualism, and resistance Mohammed . As the seat of the Baban dynasty, it quickly emerged as a leading hub for poetry, politics, and critical thought in the Kurdish-speaking world (Schmidinger, 2025). The legacy of historical figures such as Nalî, Mahwi, and Piramerd poets and thinkers who profoundly enriched Kurdish language and literature continues to shape the city's identity to this day (Ali & Abdalla, 2024).

Often referred to as the “cultural capital of Kurdistan,” Sulaimani played a pivotal role in advancing modern education, journalism, and political discourse throughout the 20th century (Glatz et al., 2024). This vibrant legacy of creativity and expression lives on through the region’s ICH, encompassing oral storytelling, spiritual practices, traditional music (such as dîlok and daf), folk dances like goven, Dilan, and Halparke, along with festive celebrations such as Newroz, the Kurdish New Year (Batu et al., 2024).

The richness of Sulaimani’s ICH is evident across its 12 districts, 43 sub-districts, and more than 1600 villages, where diverse traditions are actively practiced. From artisanal crafts like carpet weaving to regional dialects, religious diversity, traditional clothing, agricultural expertise, and culinary customs, the province reflects a vibrant cultural mosaic interwoven with daily life.

Different areas within the province are particularly renowned for unique contributions some for language and literature, others for folk music, cuisine, or theatrical and artistic expressions. Communities throughout Sulaimani also uphold distinct seasonal festivals, hairstyles, and clothing styles, further enriching the cultural fabric of the region.

Beyond its cultural richness, Sulaimani is endowed with natural beauty, including abundant rivers, lakes, dams, forests, and wide-open landscapes—making it a major attraction for nature and eco-tourism. However, despite these assets, tourism development has largely emphasized natural and historical landmarks, often neglecting the immense potential of the region’s intangible heritage.

3. Methodology

To support the management process of gathering, analyzing, and evaluating data for developing ICH maps in Sulaimani Province, a MCDA approach is utilized in combination with GIS. This method offers an effective way to meet project goals by providing a structured framework for evaluating multiple factors simultaneously. MCDA enables the comparison, assessment, and prioritization of various alternatives based on predefined criteria. It systematically addresses the complexities and trade-offs involved in decision-making processes. Key components of the MCDA process include identifying relevant criteria, assigning weights to each criterion, collecting and standardizing data, aggregating results, and producing a ranked outcome. One analytical method that fits within the MCDA framework is the Analytic Network Process (ANP), which helps model complex interdependencies among decision elements. The research methodology is organized into several main stages, which we will describe step by step.

3.1Data Collection

Sulaimani Province has its own special and unique traditions that are different from the cultures of nearby areas. We carried out detailed fieldwork to find and record the traditional practices and customs that people in Sulaimani still follow every year or season and pass on to the next generations.

To collect this information, we created a survey that included field visits, online forms, personal interviews, and attendance at local events. In total, we received and registered all 200 survey forms. The survey focused on 10 key elements of ICH and included two main questions: (1) What kinds of ICH are found in the area? (2) How important and useful is each one, rated on a scale from 1 (least important) to 9 (most important)?

Following a comprehensive assessment and in-depth investigation of the region's intangible cultural heritage, ten distinct datasets were identified as representing the primary ICH elements of the study area. These core datasets, selected based on their cultural significance and relevance, are presented in Table 1.

Table 1: Type of ICH tourism data in Sulaimani province

No	Criteria	Including details
C1	Annual festivals and celebrations	Cultural festivals, Occasions of tribes, Anniversary of cities and villages, National holidays and occasions, Religious holidays and ceremonies, Wedding ceremony, Funerals and days of mourning.
C2	Religious Reflections	Religious sect, Sufi Orders
C3	Arts and music	Musical instruments, Theatrical, Music, Dance (Halparke)
C4	Traditional food and drink	Cooking, Foods, Drinks
C5	Traditional clothing and cosmetics	Clothes, Shoes, Cosmetics and Vintage Accessories
C6	Craftsmanship	Agriculture, Leatherwork, Carpenter, Metallurgy, Weaving and sewing
C7	Traditional games and sports	Hats, hiding and tray games, Racing, horseback riding and swimming
C8	Language and dialect	Language, Accents
C9	Oral traditions and expressions	Stories, Proverbs of the Ancients, Hayran (a type of song), National sing, Hymns and poems
C10	Medical conditions the old way	Medical treatment, Herbal medicine, Health care

3.2GIS – Ready

GIS-ready refers to spatial data that has been prepared and standardized for use in GIS, enabling effective analysis, visualization, and decision-making. In tourism planning especially when applying MCDA this includes steps such as formatting, normalization, and standardization to ensure compatibility with GIS tools (Paramitha et al., 2024).

The process began by creating polygon features for the 12 districts of Sulaimani province, saved in a geodatabase using the WGS 1984/UTM Zone 38N coordinate system. An attribute table was then developed with 12 columns (for districts) and 10 rows representing various ICH elements. Each data value ranged from 1 (low tourism impact) to 9 (high tourism impact). For raster-based analysis, these polygon shape files were converted into raster format using the "Polygon to Raster" tool in ArcGIS Pro (v3.1.2).

3.3Fuzzy logic

Standardization is a critical prerequisite for the effective implementation of MCDA, particularly in the context of spatial data analysis (Demir & Yomralioglu, 2024). As a key component of data preprocessing, normalization involves converting heterogeneous data into a standardized scale to ensure consistency and comparability across diverse evaluation criteria (Dhawas et al., 2024). Within the framework of this study, data preprocessing is vital for constructing an ICH tourism map and enhancing the overall reliability and interpretability of the dataset. To address the inherent uncertainty and imprecision associated with cultural and spatial phenomena, fuzzy logic is employed as an effective analytical tool. Unlike conventional binary classification, fuzzy logic allows for continuous values between 0 and 1, enabling the representation of partial or gradual membership in a given class (Mashaleh et al., 2024). In GIS environments such as ArcMap, fuzzy logic is particularly valuable for modeling complex spatial relationships (Wang & Nanehkaran, 2024).

The dataset encompasses variables with differing levels of significance pertaining to ICH elements; consequently, the classification of data does not conform uniformly to a single scale (e.g., 1 to 9). Depending

on the relative importance and nature of each criterion, classifications vary. It is based on the opinions of experts, including university teachers, culture researchers, staff from tourism and culture offices, tourism and environmental company managers, and event organizers. Some consisting of two classes, while others comprise three, four, or even five classes. This heterogeneity necessitates data standardization to ensure consistency and comparability across the entire dataset. To address this, fuzzy membership functions were employed as a methodological tool to normalize and validate the varying values associated with each criterion.

3.4ANP and Criteria Weighting

The ANP is a multi-criteria decision-making (MCDM) method developed by Thomas L. Saaty, and it was formally introduced in 1996 as a more advanced form of the AHP (Saaty, 1994). It is designed for complex decision-making situations where elements are interrelated and influence one another (Burstein et al., 2008). It allows for feedback and interdependence among all elements in a network structure. The criteria are analyzed for their relationships, both within and between clusters (Yang & Tzeng, 2011).

The goal of ANP is to incorporate expert knowledge, used to assist decision-makers in making pairwise comparisons between the criteria. Using a significance scale ranging from 1 equal importance to 9 extreme importance for each criterion (Saaty, 2005), table 2.

Table 2: Scales for pairwise ANP comparisons Saaty and Vargas (1991)

Intensity of importance	Description	Explanation
1	Equal importance	Two factors contribute equally to the objective
3	Moderate importance	Experience and judgment slightly favor one over the other
5	Strong or essential importance	Experience and judgment strongly favor one over the other
7	Very strong or demonstrated importance	Experience and judgment very strongly favor one over the other. Its importance is demonstrated in practice
9	Extreme importance	The evidence favoring one over the other is of the highest possible validity
2, 4, 6, 8	Intermediate values	When compromise is needed
Reciprocals	Values for inverse comparison	

These judgments are then used to construct a super matrix, which captures all the influences among the elements. This matrix is subsequently normalized and weighted to reflect the significance of each component (Crawford & Williams, 1985). By multiplying the matrix until it reaches convergence, the final priority weights of the alternatives are obtained, leading to a rational and comprehensive decision outcome (Kirkwood & Corner, 1993). The consistency of the weights is assessed using the Consistency Ratio (CR). The CR measures the reliability of the judgments made during the pairwise comparisons, ensuring that the evaluation process accounts for sensitivity and incorporates uncertainty in the results (Sato & Tan, 2023).

Researchers using the ANP are required to compare the relative importance of various criteria and alternatives. The primary objective is to ensure that the resulting judgments are accurate and free from inconsistencies (Asadabadi et al., 2019). The CR is evaluated against a standard threshold, typically 0.1 (or 10%). If the CR is less than 0.1, the comparisons are considered consistent. However, if the CR exceeds 0.1,

it suggests potential inconsistencies or errors in the judgments, and the decision-maker should review and possibly revise the comparisons (Ishizaka & Lusti, 2006).

3.5Weight Overlay

The Weighted Overlay method is a widely recognized spatial analysis technique employed in decision-making processes that require the integration of multiple thematic layers (Jankowski, 1995). In this approach, each criterion is assigned a relative weight reflecting its importance, thereby facilitating the combination of diverse spatial datasets into a unified analytical framework. This method enhances the interpretation of geographic and environmental patterns by enabling a holistic evaluation of spatial variables (Ferretti & Pomarico, 2013). Various overlay models including Boolean operations (AND, OR), algebraic combinations (sum, product), and the gamma operator were reviewed and compared to identify the most suitable approach for the study objectives (Peixoto et al., 2021). By assigning appropriate weights to each criterion and integrating them into a standardized spatial framework, this method supports more informed decision-making (Chakhar & Mousseau, 2008). The final weighted layers were superimposed to produce a spatial output that highlights areas with the highest potential for ICH significance, thereby guiding cultural heritage preservation and tourism planning initiatives (Chang et al., 2022).

4. Result and Discussion

Data were systematically collected from all 12 districts within Sulaimani Province and subsequently organized into ten principal categories. Following the evaluation process, the data corresponding to these 10 criteria were transformed into a spatial format. This conversion resulted in the creation of a shape file containing polygon features representing each of the 12 districts, thereby enabling spatial analysis and visualization within a GIS environment, Figure 3.

Following the classification of data types, the influence and availability of each dataset were assessed using a scale ranging from Level 1 to Level 9. This evaluation aimed to determine the extent to which each criterion is represented and exerts influence within each of the 12 districts of Sulaimani Province. Table 3 presents a comprehensive overview of the degree of impact associated with each criterion across all districts.

Table 3, ICH Criteria Evaluation for Sulaimani Province Districts

No	Districts	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10
1	Sulaimani-center	9	9	9	9	9	9	8	9	8	7
2	Ranya	8	8	7	7	8	6	6	8	6	5
3	Chamchamal	7	8	6	7	7	6	6	8	6	5
4	Pshdar	7	8	6	7	7	6	5	8	6	5
5	Dukan	7	8	7	7	7	6	5	6	6	5
6	Darbandikhan	6	8	6	7	7	6	5	7	6	5
7	Sharbazher	6	8	5	7	8	6	5	6	6	5
8	Penjwen	6	8	5	7	8	6	5	6	6	5
9	Sharazur	6	8	5	7	6	6	5	6	6	5
10	Qaradagh	6	8	5	7	6	5	5	6	6	5
11	Saidsadiq	6	8	5	7	6	5	5	6	6	5
12	Mawat	5	8	5	7	6	5	5	6	6	5

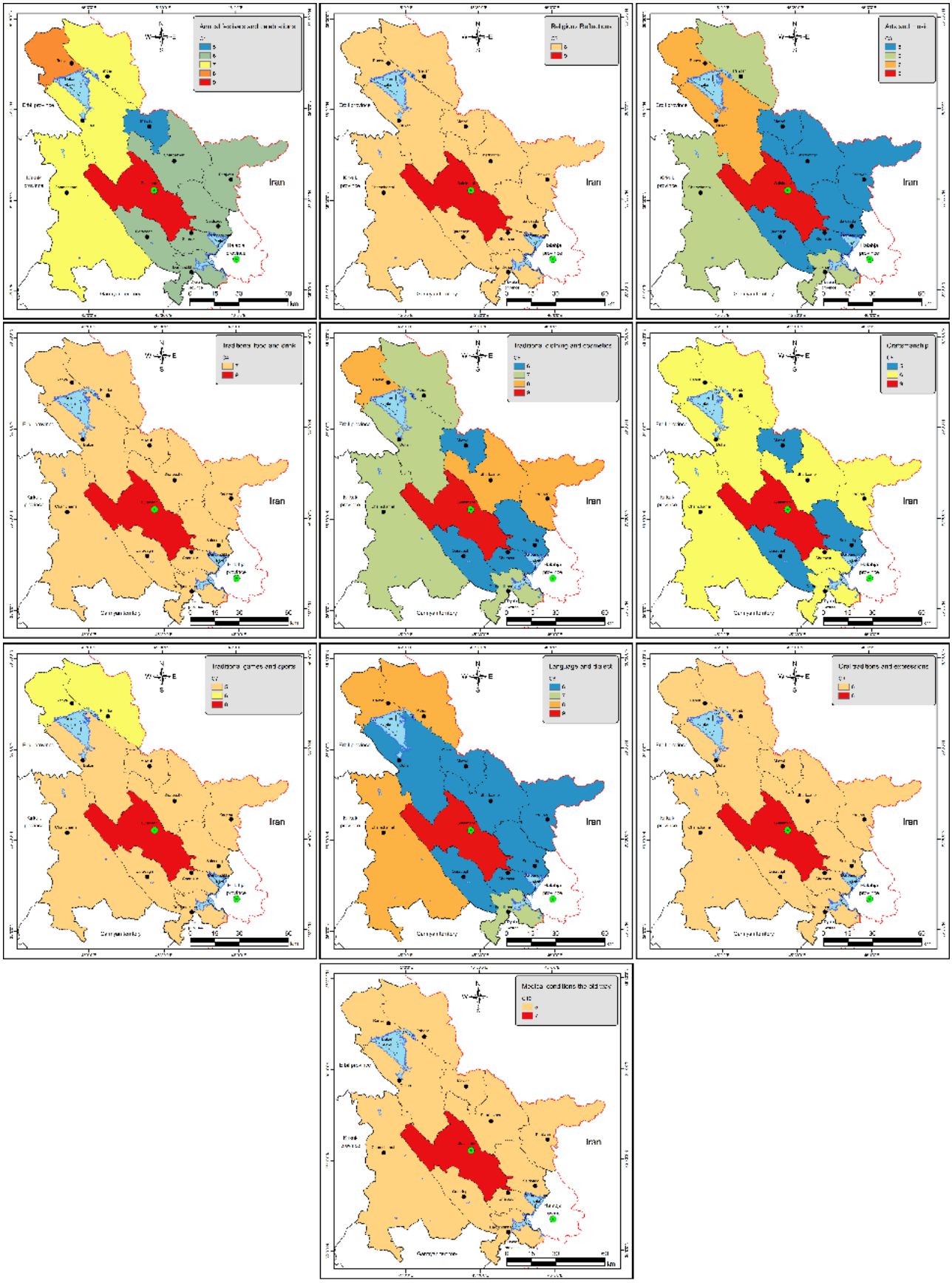

Figure 3, Maps of ICH Classes and Types in Sulaimani Province

The results presented in the table provide an evaluation of the 12 districts in Sulaimani Province based on 10 criteria related to ICH:

- Sulaimani Center scores the highest across all criteria, with many elements such as festivals, religious practices, arts, and craftsmanship receiving scores of 9. This indicates that they have a rich presence of

intangible cultural heritage, particularly in areas like festivals, arts, craftsmanship, and religious traditions.

- Ranya, Chamchamal, and Pshdar follow closely behind, with scores generally ranging from 6 to 8. These districts show a relatively strong presence of intangible cultural heritage elements, though some aspects like traditional games, oral traditions, and medical practices are slightly less pronounced.
- Dukan, Darbandikhan, Sharbazher, Penjwen, Sharazur, Qaradagh, and Saidsadiq exhibit moderate scores, generally between 5 and 8. These districts have notable ICH elements such as traditional food, language, and craftsmanship, but the presence of intangible heritage varies more across the different aspects.
- Mawat scores the lowest, with several criteria rated at 5. This suggests that they may have comparatively fewer intangible cultural heritage elements, particularly in areas like traditional games, oral traditions, and medical practices.

In summary, Sulaimani Center stands out as the district with the most significant concentration of intangible cultural heritage elements, while other districts like Ranya and Chamchamal also demonstrate considerable ICH, though to a lesser degree. On the other hand, districts like Mawat show a comparatively lower presence of certain heritage aspects and may require further efforts for preservation and documentation.

These findings serve as a basis for future spatial analysis and mapping to further explore the distribution of intangible cultural heritage across Sulaimani Province.

The shape files were subsequently transformed into raster format to facilitate the application of the ANP methodology. For the raster-based analysis, the polygon shape files were converted into raster format utilizing the "Polygon to Raster" tool in ArcGIS Pro (v3.1.2). This conversion enabled the integration of spatial data into a format compatible with the ANP steps, ensuring a standardized approach for further analysis.

Standardization was essential for each ICH raster. Fuzzy logic was applied to normalize values on a continuous scale from 0 to 1 (low to high), enabling consistency and comparability. Through the use of the fuzzy membership tool in the overlay section of ArcGIS Pro, the study's criteria were converted into fuzzy membership values. The fuzzy membership types include sigmoidal, J-shaped, linear, and user-defined functions. In this study, the linear function was selected for its suitability in transforming the data uniformly. Additionally, a cost-benefit approach was used to reclassify each criterion's seven classes into standardized scores. Figure 4.

The Pairwise Comparison and Weight Calculation step was carried out carefully and fairly. Using the ANP method in Super Decisions software, all criteria were compared in a network format with the help of experts in the field. The highest-ranked criteria were then used to build the ANP super matrix. In the end, the weights for each criterion were calculated, ensuring an acceptable consistency ratio. In the ANP method, the weights from the pairwise comparison matrix must show consistency, Table 4.

Each criterion is assigned a weight, as shown in Table 5 and figure 5. In our research, the CR is 0.042, which is below the threshold of 0.1. This indicates that the comparisons and judgments made between the criteria are consistent.

Table 5 and Figure 5, presents the ANP weights and rankings for various criteria related to ICH in Sulaimani Province. The highest-ranked criterion is annual festivals and celebrations, with a weight of 26.60%, reflecting its central role in preserving local culture. It is followed by religious reflections at 20.40%, emphasizing the importance of religious practices. Other significant criteria include arts and music (11.00%), traditional food and drink (10.50%), and traditional clothing and cosmetics (8.60%).

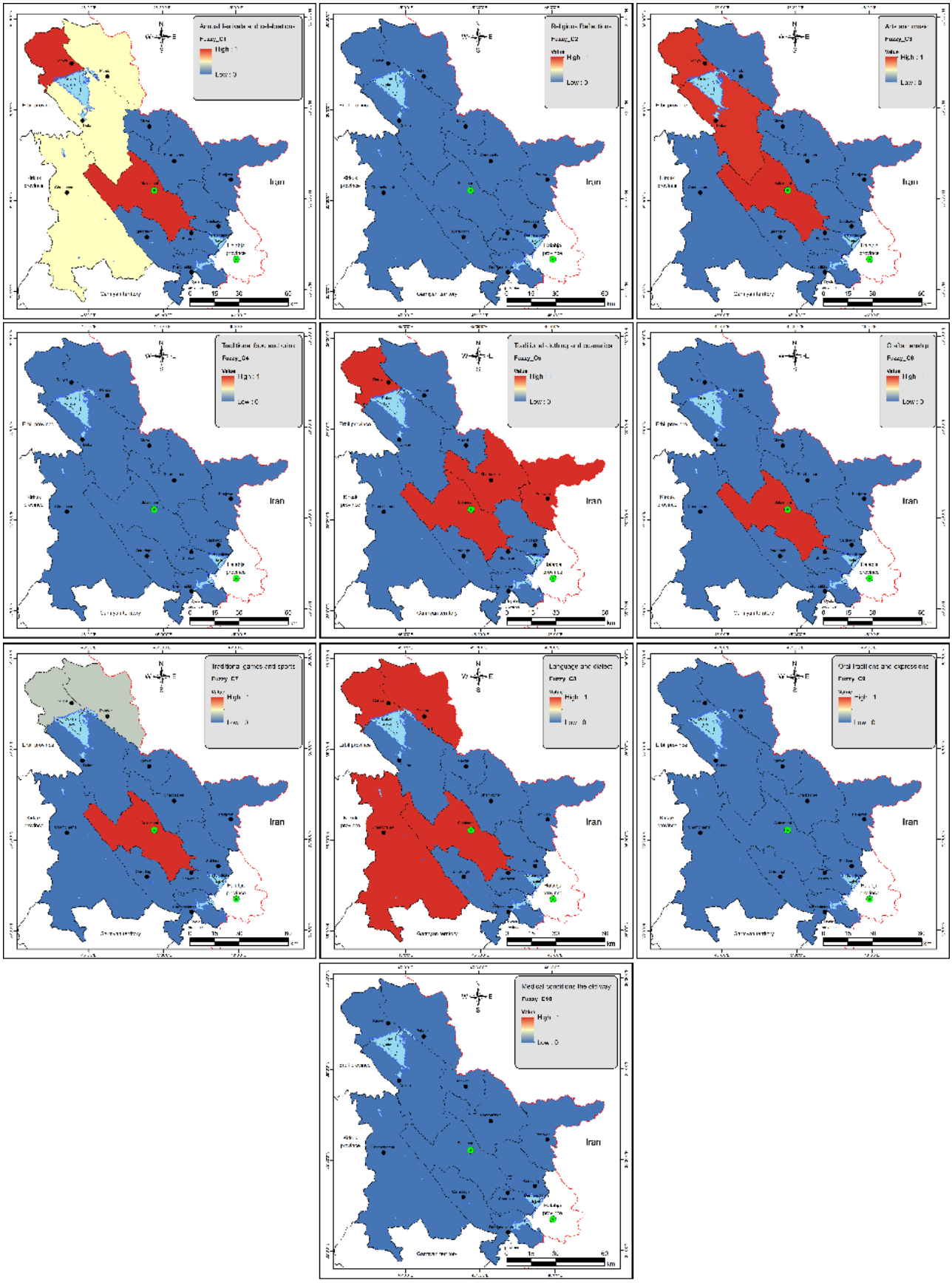

Figure 4, Standardization of ICH Criteria Using Fuzzy Logic

The remaining criteria, such as craftsmanship (5.60%), traditional games and sports (5.00%), and language and dialect (4.50%), hold progressively lower weights, indicating their importance but to a lesser degree. Oral traditions and expressions (4.30%) and medical conditions, the old way (3.60%) have the lowest weights, suggesting they are perceived as less central in the context of cultural heritage preservation in the region.

Table 4, pairwise comparison matrix for ICH criteria

Criteria	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) Oral traditions and expressions	1	0.5	0.5	2	1	0.5	0.2	0.33	0.5	0.25
(2) Arts and music	2	1	2	2	3	3	0.5	2	1	0.33
(3) Craftsmanship	2	0.5	1	2	1	2	0.2	0.33	0.5	0.25
(4) Medical conditions the old way	0.5	0.5	0.5	1	1	0.5	0.2	0.33	0.33	0.25
(5) Traditional games and sports	1	0.33	1	1	1	2	0.2	0.5	0.5	0.33
(6) Language and dialect	2	0.33	0.5	2	0.5	1	0.2	0.33	0.33	0.33
(7) Annual festivals and celebrations	5	2	5	5	5	5	1	4	4	2
(8) Traditional food and drink	3	0.5	3	3	2	3	0.25	1	2	0.33
(9) Traditional clothing and cosmetics	2	1	2	3	2	3	0.25	0.5	1	0.25
(10) Religious Reflections	4	3	4	4	3	3	0.5	3	4	1

Table 5: ANP Weights and Criteria Rankings

Criteria		ANP Weight	Rank
C1	Annual festivals and celebrations	26.60%	1
C2	Religious Reflections	20.40%	2
C3	Arts and music	11.00%	3
C4	Traditional food and drink	10.50%	4
C5	Traditional clothing and cosmetics	8.60%	5
C6	Craftsmanship	5.60%	6
C7	Traditional games and sports	5.00%	7
C8	Language and dialect	4.50%	8
C9	Oral traditions and expressions	4.30%	9
C10	Medical conditions the old way	3.60%	10
SUM		100 %	

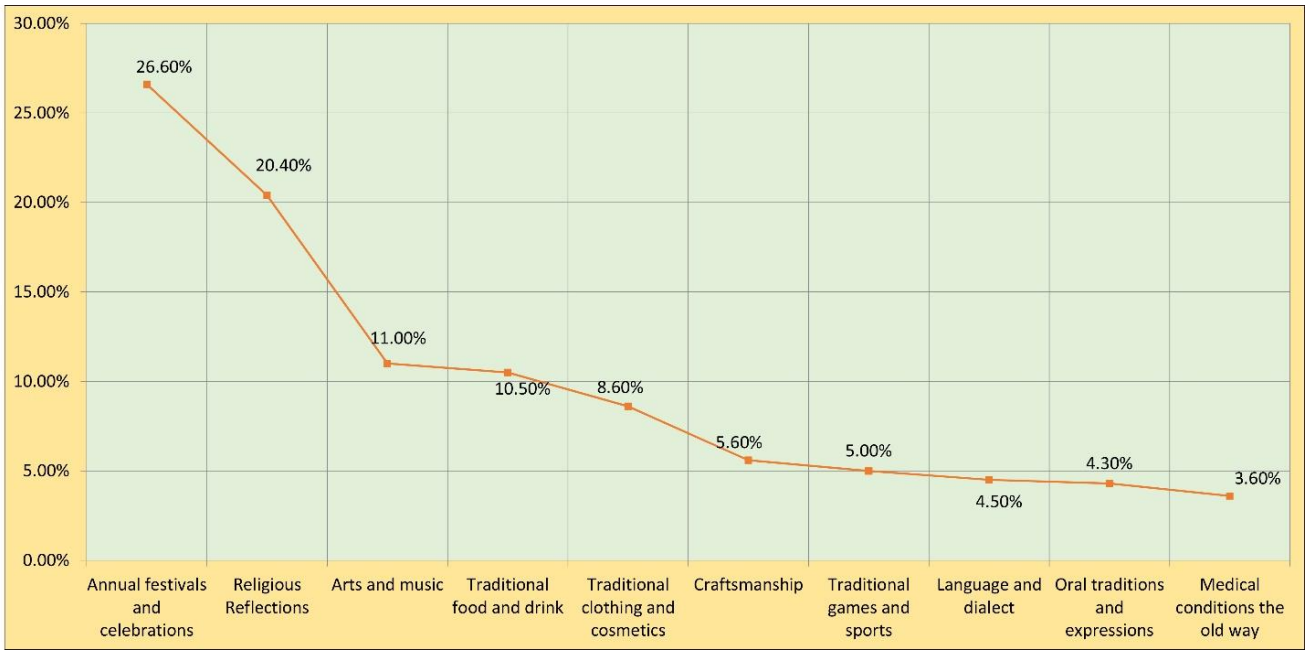

Figure 5: ANP Weight of ICH Criteria

After assigning weights to each of the 10 criteria through Map Algebra - raster calculate tools (weight value * criteria in raster format) in ArcGIS Pro, we obtained the criterion that received its true value. Figure 6

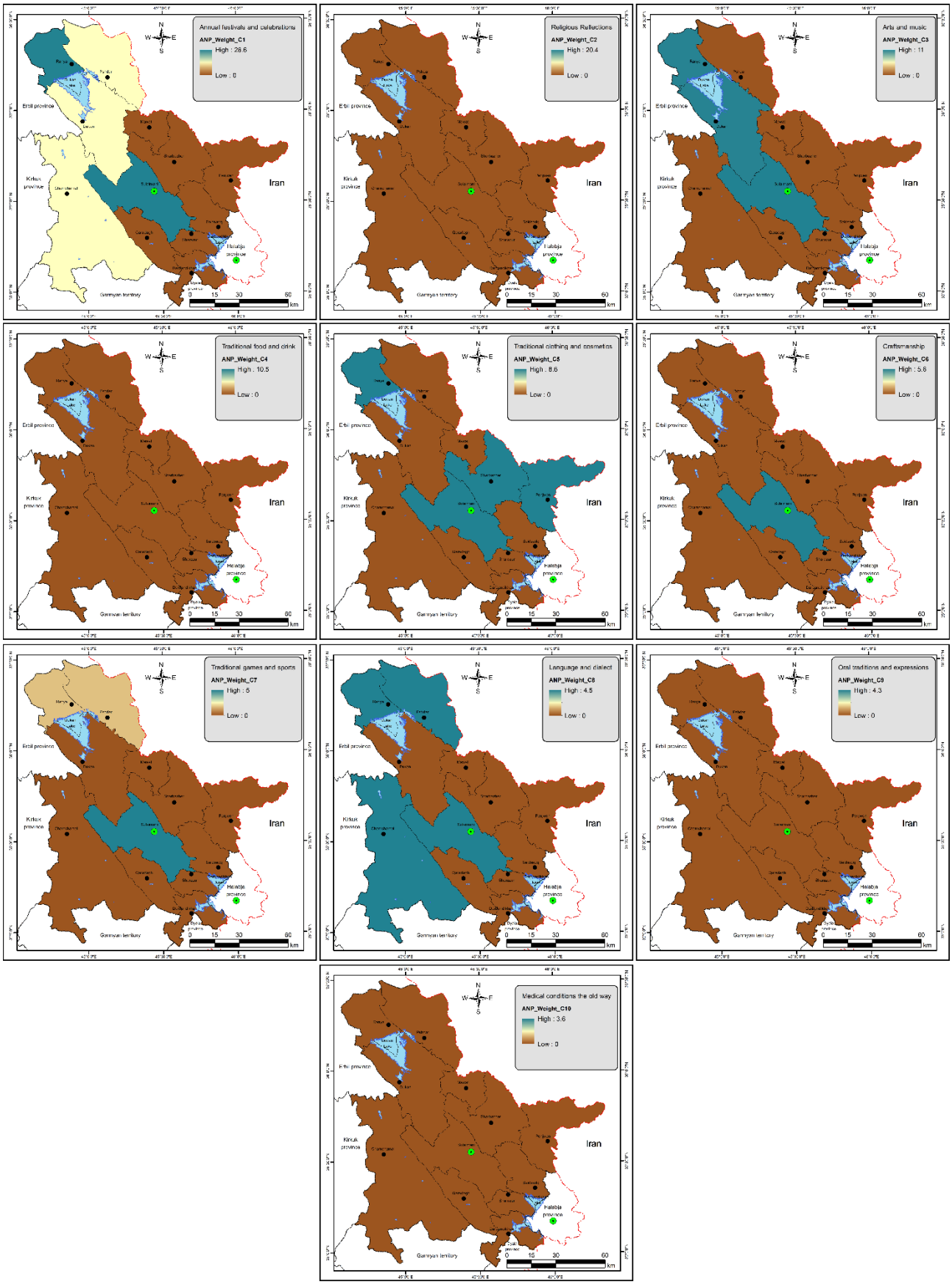

Figure 6, ANP-weighted ICH Criteria Maps

The Weighted Overlay method was employed within the GIS environment to produce a composite map delineating the spatial distribution and relative significance of ICH across Sulaimani Province. Drawing upon

extensive field observations and the degree to which the analytical outputs corresponded with on-the-ground realities, the gamma operation was identified as the most appropriate technique for this study. As illustrated in Figure 7.

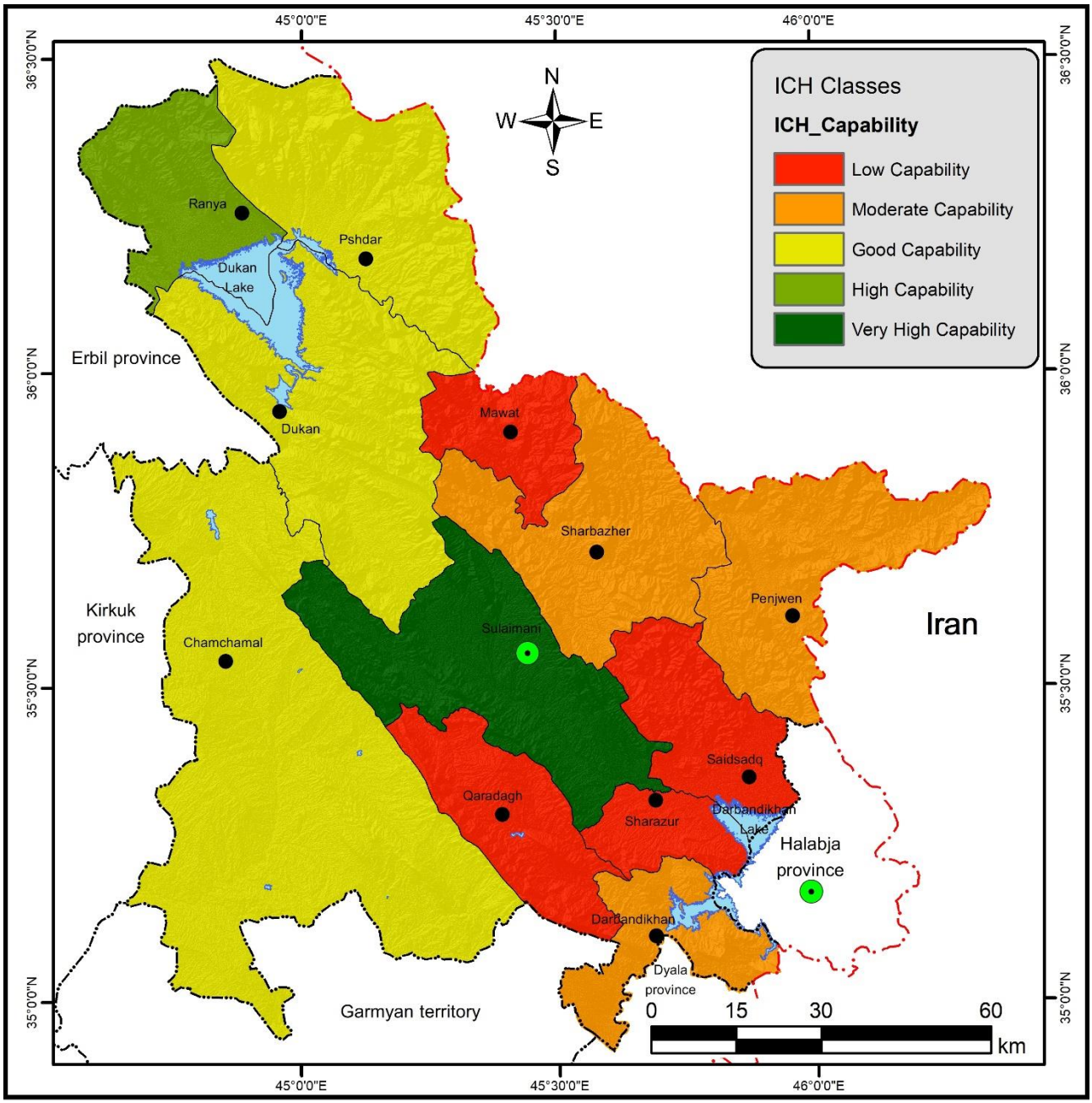

Figure 7, Final ICH tourism map of Sulaimani province using MCDA-ANP

the overlay analysis yielded critical insights into the spatial patterns of ICH, the results of which are detailed in Table 6. Table 6 presents the classification of districts in the Sulaimani province based on their suitability for ICH tourism, as derived from the final composite analysis. The districts are categorized into five classes, ranging from "Low ICH" to "Very High ICH," reflecting their relative potential for supporting ICH-based tourism initiatives.

Districts such as Qaradagh, Sharazur, Saidsadiq, and Mawat fall into the Low ICH category, indicating limited presence or influence of ICH-related assets. These areas may require further cultural documentation, preservation efforts, or tourism infrastructure development to become more competitive.

Table 6, ICH tourism suitability area of the Sulaimani province

No	ICH tourism capability classes	Description	District
1	Low ICH	This signifies a low level of impact.	Qaradagh, Sharazur, Saidsadq, Mawat
2	Moderate ICH	Implies a moderate level of impact.	Penjwen, Sharbazher
3	Good ICH	Suggests a positive impact, which could be considered as a good level.	Chamchmal, Dukan, Pshdar
4	High ICH	Indicates a high level of impact.	Ranya
5	Very High ICH	This represents a very high level of impact.	Sulaimani Center

In contrast, Very High ICH potential is found in the Sulaimani Center, highlighting its richness in festivals, arts, traditional practices, and related infrastructure. Similarly, High ICH suitability in Ranya and Good ICH suitability in Chamchamal, Dukan, and Pshdar suggest these areas possess notable, though slightly varying, levels of ICH potential, making them strong candidates for targeted tourism development strategies.

This classification is essential for guiding regional planning and investment priorities, especially when aiming to integrate cultural heritage into sustainable tourism frameworks.

5. Conclusion and Recommendations

5.1Conclusion

This study provided a comprehensive and spatially informed assessment of ICH across the 12 districts of Sulaimani Province. Using GIS-based methods integrated with MCDA and the ANP, the research successfully identified and classified the ICH tourism potential of each district. The evaluation began with the systematic collection and organization of data into ten ICH-related criteria. These were transformed into spatial datasets and processed into raster format to allow for advanced spatial modeling. Fuzzy logic and ANP weighting were applied to ensure consistency, standardization, and scientific rigor in measuring the significance of each criterion.

The findings revealed that the Sulaimani Center holds the highest potential for ICH tourism, scoring exceptionally well across nearly all criteria, especially in areas such as festivals, religious practices, and traditional arts. Ranya, Chamchamal, and Pshdar also demonstrated a strong ICH presence, indicating their readiness for focused cultural tourism development. In contrast, districts like Mawat, Saidsadiq, Qaradagh, and Sharazur scored lowest, reflecting limited ICH elements or a need for enhanced heritage preservation. The final composite map using Weighted Overlay analysis produced a spatial classification of the province's districts into five levels of ICH tourism suitability, providing a clear visual and analytical tool for planners and decision-makers.

5.25.1 Recommendations

Based on the findings and spatial analysis presented in this study, the following recommendations are proposed to enhance the preservation and promotion of ICH tourism in Sulaimani Province:

1. Prioritize Investment in High-ICH Districts: Sulaimani Center and Ranya should be focal points for cultural tourism development. Investment in infrastructure, cultural festivals, and heritage-based tourism services in these areas would yield high returns.
2. Promote Moderate-ICH Areas through Capacity Building: Districts such as Chamchamal, Dukan, and Pshdar show good potential. Targeted training, community engagement, and promotion of local crafts and festivals can enhance their tourism appeal.
3. Conservation and Documentation in Low-ICH Districts: In areas like Mawat, Qaradagh, and Sharazur, efforts should focus on the documentation, revival, and safeguarding of intangible heritage elements. Local authorities and NGOs can collaborate to identify and support fading traditions.
4. Policy Development and Integration: The findings should be integrated into regional tourism policies and cultural heritage management plans. Establishing a provincial framework for ICH tourism will help streamline efforts and resource allocation.
5. Engage Local Communities: Community participation is essential in sustaining ICH. Involve local artisans, elders, and cultural leaders in planning and decision-making to foster ownership and ensure the authenticity of the experiences offered to tourists.
6. Enhance Awareness and Marketing: Launch promotional campaigns highlighting the unique cultural elements of each district, especially targeting domestic and international tourists interested in cultural heritage.
7. Utilize GIS for Continuous Monitoring: Maintain and update the GIS-based ICH database to track changes over time. This will aid in dynamic decision-making and allow for quick responses to emerging challenges or opportunities.
8. Encourage Academic Collaboration: Universities and research institutions should be encouraged to collaborate on further studies, field surveys, and the development of digital cultural heritage repositories.

By following these recommendations, Sulaimani Province can make better use of its rich cultural traditions to build a strong local identity and support tourism that protects and values its heritage.

6. Reference

1. Ali, A., & Abdalla, S. (2024). Unravelling the Origins of Kurdish Literary Heritage: Challenges and Perspectives. Rainbow: Journal of Literature, Linguistics and Culture Studies, 13(2), 151-161.
2. Asadabadi, M. R., Chang, E., & Saberi, M. (2019). Are MCDM methods useful? A critical review of analytic hierarchy process (AHP) and analytic network process (ANP). Cogent Engineering, 6(1), 1623153.
3. Batu, M., Oz, M., Tos, O., & Kurban, V. (2024). MEDIA COVERAGE OF NOWRUZ RITUALS AND REFLECTIONS: SIMILARITIES AND DIFFERENCES ACROSS THE TURKIC WORLD. Türk Kültürü ve Hacı Bektaş Veli Araştırma Dergisi(111), 263-284.
4. Beaudrie, C., Corbett, C. J., Lewandowski, T. A., Malloy, T., & Zhou, X. (2021). Evaluating the Application of Decision Analysis Methods in Simulated Alternatives Assessment Case Studies: Potential Benefits and Challenges of Using MCDA. Integrated environmental assessment and management, 17(1), 27-41.
5. Bipu, N. A. (2019). Geographic information system & spatial analysis. International Journal for Empirical Education and Research.
6. Burstein, F., W Holsapple, C., Bennet, A., & Bennet, D. (2008). The decision-making process in a complex situation. Handbook on decision support systems 1: Basic themes, 3-20.
7. Chakhar, S., & Mousseau, V. (2008). GIS-based multicriteria spatial modeling generic framework. International journal of geographical information science, 22(11-12), 1159-1196.
8. Chang, B., Ding, X., Xi, J., Zhang, R., & Lv, X. (2023). Spatial-Temporal Distribution Pattern and Tourism Utilization Potential of Intangible Cultural Heritage Resources in the Yellow River Basin. Sustainability, 15(3), 2611.
9. Chang, J., Long, C., Lu, S., & Han, R. (2022). Does government positively support the spatial distribution of Ich? evidence of data from the Yangtze delta region of china. Sustainability, 15(1), 697.
10. Chaudhary, S., Kumar, A., Pramanik, M., & Negi, M. S. (2022). Land evaluation and sustainable development of ecotourism in the Garhwal Himalayan region using geospatial technology and analytical hierarchy process. Environment, Development and Sustainability, 1-42.
11. Crawford, G., & Williams, C. (1985). A note on the analysis of subjective judgment matrices. Journal of mathematical psychology, 29(4), 387-405.
12. Demir, S., & Yomralioglu, T. (2024). Bridging Geo-Data and Natural Gas Pipeline Design Standards: A Systematic Review of BIM-GIS Integration for Natural Gas Pipeline Asset Management. Energies, 17(10), 2306.
13. Dhawas, P., Dhore, A., Bhagat, D., Pawar, R. D., Kukade, A., & Kalbande, K. (2024). Big data preprocessing, techniques, integration, transformation, normalisation, cleaning, discretization, and binning. In Big Data Analytics Techniques for Market Intelligence (pp. 159-182). IGI Global Scientific Publishing.
14. Fadafan, F. K., Soffianian, A., Pourmanafi, S., & Morgan, M. (2022). Assessing ecotourism in a mountainous landscape using GIS–MCDA approaches. Applied Geography, 147, 102743.
15. Ferretti, V., & Pomarico, S. (2013). Ecological land suitability analysis through spatial indicators: An application of the Analytic Network Process technique and Ordered Weighted Average approach. Ecological Indicators, 34, 507-519.
16. Ghorbanzadeh, O., Pourmoradian, S., Blaschke, T., & Feizizadeh, B. (2019). Mapping potential nature-based tourism areas by applying GIS-decision making systems in East Azerbaijan Province, Iran. Journal of Ecotourism, 18(3), 261-283.
17. Gigović, L., Pamučar, D., Lukić, D., & Marković, S. (2016). GIS-Fuzzy DEMATEL MCDA model for the evaluation of the sites for ecotourism development: A case study of "Dunavski ključ" region, Serbia. Land use policy, 58, 348-365.
18. Glatz, C., Sorotou, A., Raheem, K. R., Abdullah, H. H., Mohammed-Amin, R. K., Marf, D. A., Abdullatif, N., Amin, A., Calderbank, D., & Laugier, E. J. (2024). Archaeology as Cultural Heritage in the Kurdistan Region of Iraq: Developing an Integrated Approach beyond Narratives of Catastrophe and Emergency Response. Current Anthropology, 65(S26), S55-S90.
19. Innocente, C., Nonis, F., Lo Faro, A., Ruggieri, R., Ulrich, L., & Vezzetti, E. (2024). A Metaverse Platform for Preserving and Promoting Intangible Cultural Heritage. Applied Sciences, 14(8), 3426.
20. Ishizaka, A., & Lusti, M. (2006). How to derive priorities in AHP: a comparative study. Central European Journal of Operations Research, 14, 387-400.
21. Jankowski, P. (1995). Integrating geographical information systems and multiple criteria decision-making methods. International journal of geographical information systems, 9(3), 251-273.
22. Januszewska, M., Jaremen, D., & Nawrocka, E. (2015). The effects of the use of ICT by tourism enterprises. Zeszyty Naukowe Uniwersytetu Szczecińskiego. Service Management, 16, 65-73.
23. Kadiu, A. (2024). Marketing Strategies promoting Sustainable Tourism Development in the country of Albania soe].
24. Kambanor, C. D., & Muralidharan, S. (2025). Cheesy Celebrations: Festivals and Events in the World of Cheese. In Global Perspectives on Cheese Tourism (pp. 63-122). IGI Global Scientific Publishing.
25. Kilili, R., Günay, T., & Joshua, O. Tourism Industry a Key Value Driver to Economic Growth and Development. A CASE Of NORTH CYPRUS. Nobel Bilimsel Eserler.
26. Kirkwood, C. W., & Corner, J. L. (1993). The effectiveness of partial information about attribute weights for ranking alternatives in multiattribute decision making. Organizational behavior and human decision processes, 54(3), 456-476.
27. MARANGON, K. Il teatro curdo e la sua declinazione in Iraq.
28. Mashaleh, A. S., Ibrahim, N. F. B., Alauthman, M., Almseidin, M., & Gawanmeh, A. (2024). IoT Smart Devices Risk Assessment Model Using Fuzzy Logic and PSO. Computers, Materials & Continua, 78(2).
29. Mohamadzadeh, P., Pourmoradian, S., Feizizadeh, B., Sharifi, A., & Vogdrup-Schmidt, M. (2020). A GIS-based approach for spatially-explicit sustainable development assessments in East Azerbaijan Province, Iran. Sustainability, 12(24), 10413.
30. Mohammed, H. D. Water Distribution Management in Urban Areas Based on Population Estimation Using GIS and Remote Sensing Techniques.
31. Mohammed, M. W., Feizizadeh, B., Klug, H., Ghanbari, A., & Blaschke, T. (2023). Ecotourism sustainability assessment using geospatial multiple approach in the Kurdistan region of Iraq. GeoJournal, 88(3), 3283-3306.
32. Paramitha, P. E., Sarwanto, P., Sunarnyoto, D., & Widjajanti, N. (2024). The Role of Geomatics Discipline to Support Langsa Complex Restoration Program: 3D Visualization of Subsurface and Existing Subsea Facilities Geospatial Data.

33. Peixoto, S. F., Horbe, A. M. C., Soares, T. M., Freitas, C. A., de Sousa, E. M. D., & de Figueiredo Iza, E. R. H. (2021). Boolean and fuzzy logic operators and multivariate linear regression applied to airborne gamma-ray spectrometry data for regolith mapping in granite-greenstone terrain in Midwest Brazil. Journal of South American Earth Sciences, 112, 103562.
34. Pourmoradian, S., Vandshoari, A., Omarzadeh, D., Sharifi, A., Sanobuar, N., & Samad Hosseini, S. (2021). An integrated approach to assess potential and sustainability of handmade carpet production in different areas of the East Azerbaijan Province of Iran. Sustainability, 13(4), 2251.
35. Rizaldi, A. S., Rumanti, A. A., & Andrawina, L. (2024). Sustainable Tourism Industry in Indonesia through Mapping Natural Tourism Potential: Taxonomy Approach. Sustainability, 16(10), 4201.
36. Saaty, T. L. (1994). How to make a decision: the analytic hierarchy process. Interfaces, 24(6), 19-43.
37. Saaty, T. L. (2005). Making and validating complex decisions with the AHP/ANP. Journal of Systems Science and Systems Engineering, 14, 1-36.
38. Saaty, T. L., & Vargas, L. G. (1991). Prediction, projection and forecasting: applications of the analytic hierarchy process in economics, finance, politics, games and sports.
39. Sato, Y., & Tan, K. H. (2023). Inconsistency indices in pairwise comparisons: an improvement of the Consistency Index. Annals of Operations Research, 326(2), 809-830.
40. Schmidinger, T. (2025). End of Story? Remnants of Kurdistan's Jews in the 21st Century.
41. Statistical. (2022). Kurdistan Regional Government, Ministry of Planning, Kurdistan Regional Statistical Board.
42. Tan, N., Anwar, S., & Jiang, W. (2024). The impact of cultural heritage listing on regional tourism development in China. International Journal of Tourism Research, 26(4), e2694.
43. TK, G. K. (2024). Valorization of intangible cultural heritage through documentation: an Indian scenario. Library Hi Tech News, 41(8), 10-14.
44. Tola, A., Minga, A., & Muca, E. (2024). Rural tourism: Nurturing prosperity and community resilience. Edelweiss Applied Science and Technology, 8(3), 279-289.
45. Valánszki, I., & Abualhagag, A. (2022). Land Evaluation of Recreation and Ecotourism Services Using Multi-Criteria Evaluation Process: A Case Study of Aswan City, Egypt. Journal of Environmental Geography, 15(1-4), 11-22.
46. Wang, X., & Zhan, S. (2022). Exploring the Spatial Distribution of ICH by Geographic Information System (GIS). Mobile Information Systems, 2022.
47. Wang, Y., & Nanehkaran, Y. A. (2024). GIS-based fuzzy logic technique for mapping landslide susceptibility analyzing in a coastal soft rock zone. Natural Hazards, 120(12), 10889-10921.
48. Yang, J. L., & Tzeng, G.-H. (2011). An integrated MCDM technique combined with DEMATEL for a novel cluster-weighted with ANP method. Expert Systems with Applications, 38(3), 1417-1424.