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PERSPECTIVES OF THE TOURISM DEVELOPMENT IN TERMS OF WATER CRISIS (CASE STUDY OF IRAN)

Е. Шаріфзаде Агдам, А. Хейроллахі, Л. М. Немець. ПЕРСПЕКТИВИ РОЗВИТКУ ТУРИЗМУ В УМОВАХ ВОДНОЇ КРИЗИ (НА ПРИКЛАДІ ІРАНУ). Іран – це країна, яка страждає не тільки від нестачі води, але і втрачає все більшу кількість доступних водних ресурсів. З іншого боку, ті, хто приймає рішення, затвердили подвійний план у 2004 та 2015 роках. Так звані 20-річний перспективний план туризму в Ірані (20YPT) та шостий план розвитку (SDP) мають намір реєструвати до 2025 року 20 мільйонів туристів. Дослідження ставить за мету оцінити та обчислити кількість води, яку потребують туристи, якщо і плани 20YPT, і SDP досягнуть успіху щодо трьох сценаріїв, для того, щоб відповісти на два наступні питання: 1 – Яку кількість води потребуватиме туристичний сектор? 2 – Який обсяг води сектор побутових комунальних послуг поділиться з туристичним сектором до 2025 року? Для відповіді на ці питання були використані статистичні методи, вивчення документів та інтерв'ю з експертами в рамках Delphi щодо систематичного методу вибірки. Проаналізовано обсяги споживання води в різних секторах економіки в світі, в Ірані, особливості впливу туризму на навколишнє середовище, розкрита проблема нестачі води в туристичній галузі. Зроблено прогноз кількості іноземних і внутрішніх туристів в Ірані за період 2016-2025 рр., спрогнозовані обсяги споживання води в туристичній сфері за трьома сценаріями: водокористування стабільно і однаково з місцевими жителями; водокористування вдвічі більше, ніж у місцевих жителів; використання води паралельно з темпами зростання світового попиту, які складають 4-8% в рік. Результати показують потенційну загрозу, якщо прогнози вірні, значна частина доступної чистої води на побутовій ділянці буде спрямована на туризм (від 19,5 до 69%). Перший сценарій визначений як оптимальний, другий варіант як кризовий, а третій – то, що розглядається. Визначено середню кількість води, необхідну для туристичного сектора з урахуванням неврахованої води, розроблено концептуальну модель наслідків незапланованого управління водними ресурсами в туризмі Ірану у 2016-2025 рр.

Ключові слова: водна криза, туризм, Іран, вода, водні ресурси, 20YPT, SDP, внутрішній сектор.

Э. Шарифзаде Агдам, А. Хейроллахи, Л. Н. Немец. ПЕРСПЕКТИВЫ РАЗВИТИЯ ТУРИЗМА В УСЛОВИЯХ ВОДНОГО КРИЗИСА (НА ПРИМЕРЕ ИРАНА). Иран – это страна, которая страдает не только от недостатка воды, но и теряет все большее количество доступных водных ресурсов. С другой стороны, те, кто принимает решения, утвердили двойной план в 2004 и 2015 годах. Так называемый 20-летний перспективный план туризма в Иране (20YPT) и шестой план развития (SDP) намерены регистрировать до 2025 года 20 млн. туристов. Исследование ставит целью оценить и вычислить количество воды, в которой нуждаются туристы, если и планы 20YPT, и SDP достигнут успеха по трем сценариям для того, чтобы ответить на два следующих вопроса: 1 – Какое количество воды потребует туристический сектор? 2 – Какой объем воды сектор бытовых коммунальных услуг поделится с туристическим сектором до 2025 года? Для ответа на эти вопросы были использованы статистические методы, изучение документов и интервью с экспертами в рамках Delphi по систематическому методу выборки. Проанализированы объемы потребления воды в разных секторах экономики в мире, в Иране, особенности влияния туризма на окружающую среду, раскрыта проблема недостатка воды в туристической отрасли. Сделан прогноз численности иностранных и внутренних туристов за период 2016-2025 гг., спрогнозированы объемы потребления воды в туристической сфере по трем сценариям: водопользование стабильно и одинаково с местными жителями; водопользование вдвое больше, чем у местных жителей; использование воды параллельно с темпами роста мирового спроса, которые составляют 4-8% в год. Результаты показывают потенциальную угрозу, если прогнозы верны, значительная часть доступной чистой воды на бытовом участке будет направлена на туризм (от 19,5 до 69%). Первый сценарий определен как оптимальный, второй вариант как кризисный, а третий – рассматриваемый. Определено среднее количество воды, необходимое для туристического сектора с учетом неучтенной воды, разработана концептуальная модель последствий незапланированного управления водными ресурсами в туризме Ирана 2016-2025 гг.

Ключевые слова: водный кризис, туризм, Иран, вода, водные ресурсы, 20YPT, SDP, внутренний сектор.

Introduction

Tourism is an interactive phenomenon between tourist, nature and host community. [16] This sector is beyond industry that helps local markets to prosper and is spread out all over the globe. [12] With

regards to restricted available resources and critical conditions of main water resources, there should be a proper and stable framework. Therefore, tourism expansion is sustainable when it not only keeps natural resources for next generation but is also envi-

ronmentally friendly. Tourism should lead to local benefits with respect to ecological concerns and be aligned with social outcomes (Vujičić et al., 2018) [50].

Thus, identifying exact factors, analyzing the amount and the way of natural resources use, including water resources, their condition, pollution and unsustainable use, considering upcoming years with respect to strategic planning, can be very useful and is necessary. As a consequence, to identify factors that play important roles and their effects on "tourism planning", and moreover through predetermined purposeful short and long term steps in addition to adopting tourism development strategies may lead to interests in result [25].

Caring for natural resources in the coming decades requires planning for this activity and requires a detailed comprehensive study of this issue. Planning for future with strategic consistency due to its inherent features like rational decision making style (Jimenez, 2012: 583) and known pathway to desired future (Gates, 2010:), has made it necessary to consider this approach. [25] Therefore, in these studies the main objective is to optimize efficient and quality of planning the use of natural resources in uncertain conditions for the coming years [22, 48].

Even though many researchers have tried to identify and discover the different aspects of tourism, and proposed different patterns to evaluate sustainable tourism situation, [29] the significant issue is lack of a clear prospective view with respect to ecological matters, particularly water resources in underdeveloped countries that usually leads to destructive outcomes (Lukić, 2019) [11].

Iran is located on the dry region of the earth and has experienced droughts and water crisis for thousands of years. Geographical location, precipitation regime and temperature status have led to dry weather dominating the weather picture across the land. Iran's territory comprises 1% of global lands but has only 0.36 % of the average global precipitation [34] so water scarcity and crisis are common in most regions of Iran [31, 35].

Water related problems are of the most challenging barriers on the path of economic prosperity and development for Iran's tourism in decades to come. [34] We don't consider purposeful strategy for ecological and environmental matters and water resources conservation is regarded. Since water crisis becomes worse and available water for domestic sector as a sector which provides water required by tourism is limited, we have tried to estimate the number of tourists (both domestic and international) followed by the amount of water needed by tourism sector in Iran by 2025 in this research.

Aims of the study

- To clarify how valuable natural resources associated with tourism industry are:

- To assess efficiency of the relation between water resources and sustainable development of tourism industry

- To promote ecofriendly skills of visitors in order to have an interactive relationship with tourism assets

- To maximize economic, social and environmental benefits for both local communities and tourists

- To find out the value of Iran's experience with tourism development with conservation of natural resources for other countries, in particular for Ukraine.

With respect to the discussed subjects, the main questions are asked accordingly:

1- If 20YPPT and SDP meet their goals, how much water will be needed for tourism sector in Iran by 2025?

2- What will be the main challenges in the path of Iran's tourism in the next 10 years, regarding water resources?

3- Comparison of experience and problems of tourism development in Iran with a similar one in Ukraine.

Tourism water resources and environmental changes prospective are a precisely defined process that outline the long-term strategic research domains that dim the financial outcomes. Moreover, they offer the least damage to environmental matters, as well as providing suitable and sustainable scenarios to conserve/safeguard the environment. As a consequence, we provide our study that in terms of subject and covered area, it is kind of planning. Thus, according to the scale and the subject, this study is the first ever been carried out in Islamic Republic of Iran.

Analysis of previous research

Earlier studies on water and tourism focused solely on direct (onsite) water use in tourist facilities such as hotels, golf courses and swimming pools [18].

Lundie et al. (2007) estimate water use along with energy use, greenhouse gas emissions and ecological footprint for different tourism niche markets in Australia; their results show that tourism markets with high daily expenditure also appear to have the highest environmental impact [32].

World Bank & IMF (2007) claim that the amount of direct water use by tourists is not a matter of concern but the majority of water consumption goes for indirect activities including laundry, hygiene, cleaning and irrigation, they also report that due to many different industrial cleaners in the water wastes of hotels and resorts, nearby ground waters and rivers would be polluted easily. [30] Black & King (2009) studied water situation in Africa, they concluded that by 2050 some of the countries

in this continent including Tunisia, Morocco, South Africa, Moldavia, Dominica, Barbados and Malt with active tourism sector will face intense water crisis [4]. Reitano (2011) studied water use in Malta, their results show that due to high number of tourists the amount of the amount of water use of aquifers in this country is 58 billion m³ while the renewable capacity of the ground water is just 30 billion m³ [41]. Gössling et al. (2012) Review direct freshwater consumption in tourism from both quantitative and qualitative viewpoints to assess the current water demand of the tourism sector and to identify current and future management challenges. They conclude that even though tourism increases global water consumption, direct tourism-related water use is considerably less than 1% of global consumption, and will not become significant even if the sector continues to grow at anticipated rates of around 4% per year (international tourist arrivals). [19] Barberán et al. (2013) found that the average use per room per night in a four star hotel in Zaragoza, Spain, was 124.3 L of which 41.2 L were for hot water alone [1]. Tortella and Tirado (2011) reported a variation in water use between 156 L and 2425 L per guest night for hotels in Mallorca, Spain, and a range of variables were tested to examine what drives the differences between individual hotels [47]. Torres-Bagur M., Ribas A., Vila-Subirós J. (2019) note that lower water availability and growing needs due to climate change and an increase in the number of tourists in the Mediterranean basin are likely to exacerbate conflicts between socio-economic sectors that depend on the survival of water. Researchers conducted 19 detailed interviews with owners and managers of hotels in the Muga River Basin (Girona, northeastern Spain), analyzed measures to save water use, and studied proposed incentives and barriers. They found that the size of the hotel, category and year of construction / reconstruction were directly related to the implementation or lack of certain measures. They noted that efforts are needed to improve incentives and raise awareness and knowledge about water saving measures among hoteliers in this part of the Mediterranean basin, where water is a necessary resource for the tourism industry and many other sectors [58]. Also, the authors of Torres-Bagur M., Ribas A., Vila-Subirós J. (2019) investigated the identification of the main problems associated with climate change in order to develop effective mitigation and adaptation strategies to ensure the sustainability of tourism and natural resources on the example of the Mediterranean basin, which is a leading international tourism destination, especially vulnerable to the effects of climate change [59].

Behrouz (2013) has used SWOT method to analyze Iran's tourism, his results show that water

shortage in this country will be one of the most powerful barriers in the way of tourism development [3]. Becken (2014) Based on data from the AQUASTAT and EarthCheck tourist accommodation databases, analyzed tourism-related water use in 21 countries and compared it with other municipal use. Results show that the disparity between tourist water use and that of locals is also greatest in low or mid-income countries. On the other hand industrialized countries, in contrast, are characterized by high tourism water efficiencies, with no apparent discrepancy in water use between tourism and non-tourism users [2]. Cazcarro et al. (2014) have used a highly disaggregated input-output model to estimate tourist water footprints in Spain, offering a detailed breakdown of direct and indirect (from both local and imported products) water use. They conclude that in order to maximize potential water savings, the tourism industry should aim to reduce the quantity and water intensity of inputs used directly or indirectly in the production of tourist goods and services [7]. Another study is Sun & Pratt (2014), who estimate Eco-efficiency in terms of carbon and water use intensity for Chinese tourists in Taiwan, and compared this to four other major country markets. Their results show that Chinese tourists have a higher water use intensity compared to other tourists, mainly due to high expenditure on food products [43]. Hadjikakou (2015), showed that cheaper forms of tourism tend to have a significantly lower total water use and, depending on the economic impact indicator of interest, may have above-average economic contribution per unit of expenditure [21]. Page et al. (2015) studied water use approach (WUA) among tourists in Zambia, Gambia and Dominican, their results show that water shortage and its increasing intensity due to over use and climate change will result in formal and informal quarrels between tourists, local residents and the environment. In their eyes unawareness about water value is the reason for water scarcity in these countries [38].

Padli et al. (2015) investigates the impact of economic indicators and climate change on water demand for 13 states in Malaysia; results of their study indicate that total consumption per capita, agriculture and population density have a positive impact on water demand [37]. Tian et al. (2015) studied Yuan Yung in china and defined 4 components in tourism water use, 1- water use in accommodations 2- water use in transportation, 3- water use in food production and 4- water use in hygiene. Their results show that food production and hygiene covers 38% of the total water use in this region and are the dominant water users among other components. Also they claim that every destination have a water threshold, and this threshold for the case study area

is 14500 visitors per day, any number more than that would endanger the sustainability of the tourism in the region. [46] Tapper et al. (2015) believe that facing water crisis in touristic destinations like Mediterranean region, north of Africa and Caribbean's will intensely lower the popularity of these region. [45] Some other researchers suggest that in the matter of tourism, attentions must be paid first to the tourism economic benefits then to its environmental impacts, for example Zhang (2016) studied tourism in Zhiang Valley in china and suggested that tourists must be encouraged to consume as they wish to, in order to encourage more tourists to visit this destination via oral advertising in his opinion increasing GDP is more important than environmental impacts. Wells et al. (2016) suggests that educating tourism employees in hotels and other water consuming facilities related to tourism can have a great role in reducing water footprint of the employees and the sector in general [51]. Di Clemente et al. (2019) have tried to generate new sensitivity about the value of water and its importance in socioeconomic development and environmental conservation. The empirical results show the beginning of a change in water-based tourism from both a supply- and demand-side perspectives [10]. In our previous studies, we, in particularly, considered groundwater as a factor in sustainable regional development (Niemets L, 2016) [56], the importance of natural resource potential, including water resources, in the formation of Development Strategies for the regions of Ukraine (Niemets K., 2018) [54] and for the development of rural tourism in Ukraine (Niemets L, 2018) [55], the use brownfields and greyfields (Morar et al., 2016; L. Niemets..., 2018) [60], industrial heritage (Morar et al., 2019; L. Niemets..., 2019) [61], features of post-industrial development of Ukrainian cities based especially on the tourism development (L. Niemets..., 2019) [62], smart transformation (Niemets et al., 2018) and technology advancements (Kostrikov et al., 2018; Stankov et al, 2019).

Methodology

A comprehensive study of tourism development prospects in a water crisis lies in the objective field of the study of human geography, it should be based on methodological tools of human geography, it envisages the use of systematic, synergistic and information approaches, GIS approach and spatial analysis (Kostrikov, ... 2018) [57], as well as the key research methods, first of all – analysis of the state, dynamics, monitoring the development of the studied object (Niemets K, 2016) [53].

Water related strategic research is a kind of planning aimed at the realization of long-term goals in tourism and water resources prospective in Iran, which is based on the goals of the two above men-

tioned plans, (20YPPT & SDP). Such research helps us to assess the water use that this sector needs, in this path, and its impact, thus views of experts and bright minds in the field are necessary.

In current study, researchers aim to clarify the type and intensity of the impact of tourism sector on water resources till 2025. Undoubtedly by clarifying these impacts, there will be a possibility to identify the exact amount of water tourists might need in these mentioned years and to make effective decisions through identifying weaknesses and opportunities. So, in this study we assume that according to 20YPPT and SDP plans, the number of international arrivals will experience 15% annual growth and this flow will continue till 2025. On the other hand, domestic tourists would have the same growth rate as the population. With this method, we can calculate the number of tourists for each year till 2025. Also, according to statistics, the amount of available water per capita will be calculated and its decreasing rate will be clarified. After that, share of fresh water of each sector of the country will be calculated as well. In the next step, the amount of water needed for tourists will be calculated for each year till 2025 and finally, that amount will be compared to the total share of domestic sector.

It is necessary to mention that after the Iranian Islamic revolution in 1979, due to factors like lack of hard work and management skills and intentional ignorance, very few of the development plans have reached their goals. For example, in 2016, the number of international arrivals was at least 50 % behind the scheduled growth approved in the 20YPPT and in the most optimistic view, this was 26 % behind the goals of SDP. (ICTHO) The research method in this study is a descriptive-analysis, in the first step, based on the title of the study, theoretical approaches and empirical considerations, collecting data method was documentary and based on 20YPPT and SDP documents.

In continue, using forecasting approach, in a framework consisting of factors and parameters effective on water required by tourists in Iran, we have analyzed the environmental impacts of water usage by tourists in micro and macro scales. Also, document study and open questionnaire in Delphi framework along with scenario analysis has been used; further, estimations of the numbers are based on statistics given by governmental organizations in if they were reliable.

Our research involves, in particular, strategic planning of tourism development in terms of the water crisis, and speaking of planning, we should mention the need to build an executive system, an important element of it is the monitoring subsystem (Niemets K,... 2016) [53]. It provides primary information on the state and behavior of the natural

system and functioning of the executive system, its primary analysis, processing, synthesis, storage and communication. Monitoring information is used to

justify, make and implement management decisions. In order to evaluate the outcome of a management impact, there is a feedback channel (from object to

Table 1

Required Data

	Data	Source
1	Total amount of renewable water in Iran (million m ³)	Ministry of power of IRI
2	The amount of annual decrease in water per capita	Study estimation
3	Domestic sectors share of renewable water (%)	Organization of water and sanitation
4	Total amount of consumed water in domestic sector	Ministry of power, ministry of agriculture
5	Number of international arrivals in 2015	Document of Iran's tourism prospective (2015)
6	Average of foreign tourists stay in destination in 2015	Document of Iran's tourism prospective (2015)
7	Expected growth rate for tourists till 2025	Sixth Development Plan (SDP)
8	Number of domestic tourists who end up staying at least for one night in accommodations like hotels	Center of statistics in Iran
9	Direct and indirect water usage by tourists considering the accommodation situation	[19]

Source: Study Findings

Table 2

Field of Expertise and Education Level of Delphi Method Participants

Field of Expertise	Number	Education level	Number
Future analysis planning	4	Diploma	3
Hospitality Planning	8	Bachelor's Degree	10
Urban Management	4	Master's Degree	13
Political management	3	Ph.D	9
Spatial Management	4		
Tourism Management	5		
Water Resources	5		
Environment	2		

Source: Study Findings

the subject of management) through which the primary monitoring information – the flow of signals about reaction and the state of the object - is circulated. It is also worth noting that recently the ineffectiveness of the management activity of the society has become increasingly clear. Society, taking on the function of system - and mode-shaping factor in nature, did not ensure the proper level of environmental management, it is necessary to move to the study of natural systems and processes from the standpoint of information interaction. The amount of monitoring information in the general case may be different, but should provide a reliable assessment of the state of the environment (Niemeys K, ... 2016) [53].

Theoretical literature

Tourism and Water Resources

Water is one of the vital resources for economic development and vital activity. This matter has had a vital role in locating settlements, development and structure of communities throughout human history. [8] Renewable and adequate water resources and

also conserving these resources via effective skilled management is now and has always been vital to guarantee all aspects of human and other animal's lives [52]. Therefore, carelessness toward this vital source can result in a bitter crises for mankind and also all living creatures. That is why the global economy forum has claimed water shortage to be the 8th biggest problem in the new world and estimates that any country may face drought once every 10 years. Globally, approximately 70 % of renewable water is being consumed in agriculture sector while this share in Iran is 92 %. Industry takes 20 % and domestic sector takes 10 % of the total available water. This share in Iran is 4 % for industry and 4 % for domestic sector. The amount of water per capita in years 1998, 2025 and 2050 is anticipated to be 6918, 5103 and 4380 cubic meters. That is a noticeable decrease [6]. Not to mention that these water resources are distributed unequally around the world. Tourism is effecting the environment that it is interacting with. This industry even has a 4-5 % share in greenhouse gas emission [18]. Develop-

ment in tourism industry encourages investors to invest in this sector while they might not be aware about the impacts of their investment on environment and local communities [42].

One of the most important challenges that tourism is facing is the presence of environmentally clear water that tourists consume during their period of stay. Salt increase in water resources, land degradation and quality decrease in surface underground water resources are the impacts that tourists with high water consumption rate can impose on natural resources in destinations.

Water crisis and tourism

Tourism is divided into many sorts of activities. Cultural tourism, natural tourism, eco-tourism, winter tourism, 4S tourism, adventure tourism, etc. All these activities have one thing in common, they all rely on water, so they cannot be done without having access to a certain amount of water.

Tourists need water for personal use in accommodations and also many tourist activities depend on water. Meanwhile, in most cases the average water use among tourists is more than that of the locals' consumption. This dependence on water has made this matter a vital source in the sector. Therefore, several tourist destinations are facing water related problems, many of these destinations are located in regions that the water shortage has always been a problem and it is becoming worse, has always been a problem and has become worse with the introduction of tourism. Highest water consumption in destinations usually happens in hot seasons. In this season water consumption rate goes up in both international and domestic tourists. Tourism's increasing need for and dependence on fresh water has led countries to use not only the sustainable resources but also other available resources, and this flow has led to many countries having to face water-related problems. Tourists usually consume water 2-5 times more than local residents. Generally, the amount of water being used by tourists is twice as much as host community members. In this sector, by both accommodations and tourists, water is being used more than the average use of host communities.

This overuse can lead to water shortage in one hand and additional waste production on the other. [44] In this sector, hotels mostly have negative impacts on the environment, the scale of these kinds of impacts is considerably more than what communities assume [5].

A decent suite in a 5 star hotel consumes an average 1400 liters of water per night, this amount of water is equal to the provision of water needs of 14 local residents of that very destination. [28]

Water use is divided into two categories: 1- Direct Use 2- Indirect Use. Direct water use refers to

the water tourists use directly for drinking, showering or brushing their teeth, etc., Average amount of this usage is 150-400 liters per night [18]. Indirect water use refers to the amount of water needed for providing food, accommodation, construction and maintenance¹ (Page et al. 2014), which is considerably more than direct usage [30].

Water crisis in Iran and its relation with Tourism

According to three international water measurement indexes (Falken Mark Index, International Water Management Institute Index, and United Nations Index) Iran is currently in an unsuitable situation [35]. On the other hand, total annual precipitation in Iran is a number near 400 billion m³. Of this amount, 270 billion returns back to atmosphere due to vaporization, of the remaining 130 billion, 92 billion joins surface waters and 38 billion gets added to underground aquifers.

Total annual precipitation for Iran is 250 mm which is one third of the global average. Unfortunately, based on Mohammadi (2010), precipitation in this country is reducing 0.64 mm annually [33]. Furthermore, according to World Bank statistics, water usage index for drinking for 1 person is 1 m³ per year and for sanitation related activities is 100 m³ per year. Meanwhile, in Iran these indexes are intense due to not having second pipelines for uses other than drinking, people use clean water to wash cars, water gardens, etc. For this reason, Iranians use 70-80 % more water than the global average. In another statistic, average water use per person is 580 m³ annually while this amount in Iran is near 1300 m³. Iranians not only overuse water, but also they overuse other resources like electricity. For example, domestic electricity usage per capita in Iran is 2900 K/H, while global average is less than 1000 K/H. In other words, Iranians use electricity triple the global average. Generally, water resources in Iran are under tremendous pressure due to overuse, this water cannot be replaced or recycled with fresh water every year, so it seems that water crisis in full scale is inevitable in Iran till 2025 [39].

According to acquired data, water per capita in 11 provinces out of 31, is less than 1700 m³ which shows that these regions are on the edge of a water crisis [36]. Meanwhile, some organizations like Ministry of Power or Ministry of Agriculture claim that the water crisis threshold is 1300-1400 at the best assumption. The amount of renewable water per capita in Iran has consistently reduced from 7000 to 1990 m³ in just 40 years [14]. Even the aq-

¹ For example, in order to provide just food for only one person, 3000 liters of water is required. Meanwhile all a tourist needs for drinking as a direct use, is 2-5 liters per day.

uifers Iran shares with other countries are in a bad situation. [14] Iran acquires 30 billion m³ of renewable water in 2016, meanwhile 58 billion m³ is pulled out of underground aquifers, almost twice as much as the usable capacity. In year 2015, Iran had 700000 water wells, 300000 of which were illegally dug [27]. The average land drop in Iran is 20 centimeters annually while this phenomenon in some areas reaches over 8 meters. The share of domestic, industry and agriculture sectors in Iran of renewable water is 4, 4 and 92 % respectively. Even though the water efficiency in agriculture despite all this usage, due to the sector being traditional, is very low and around 30 %; this means 62% of that valuable water is being wasted every year [35]. It is estimated that renewable water per capita in Iran will decrease to under 800 m³ till 2021, while in that same years, average global water per capita will be 1000m³ [17].

The goals of SDP and 20YPIT

In 2016, Iran's tourism growth rate was twice as much as the global average, nevertheless, Iran's total arrivals do not include more than 0.05% of total international tourists. Iran had 5200000 arrivals in 2015, therefore Iranian policy makers approved 2 plans to compensate for the lack of arrivals: 20YPPT which was approved in 2005 and SDP which was approved in 2016.

20YPIT, approved on January 3, 2005; according to this plan Iran has to attract at least 1.5 % of the global arrivals till 2025 and have the tourism

revenue rise up from 0.07% to 2% till the end of the program. This means that it would have 25 billion US dollars income from tourism till 2025.

SDP: approved in 2015, in this plan also, policy makers intended to have 15 % annual growth in international arrivals between 2015 and 2020. From which, Iran would have 13 million arrivals and 10 US dollars revenue for the sector. In this plan they are attempting to attract 1 % of Chinese tourists, 1 % of Russians, 1 % of Europeans, 3 % of Shia Muslims and 1 % of total Muslims of the world which, if they succeed, the number will reach over 32 million arrivals annually. This amount could compensate for all the plans approved previously.

In the following step, the average annual amount of water degradation per capita has been calculated. After studying the related documents, it has been revealed that the average amount of renewable water per capita was around 7000 m³ in 1952, meanwhile this amount in 2016 was just 1300, so it can be concluded that water degradation amount in Iran is a number between 75-103 cubic meters per year and this flow continues to go on. Therefore, the shares of domestic and tourism sectors of renewable water till 2025 is estimated, it is needless to say these amounts will be calculated based on the share of domestic section which is 4-5 %.

It is necessary to mention that this average has been calculated in the most optimistic view, simply because we have been witnessing more diversity in

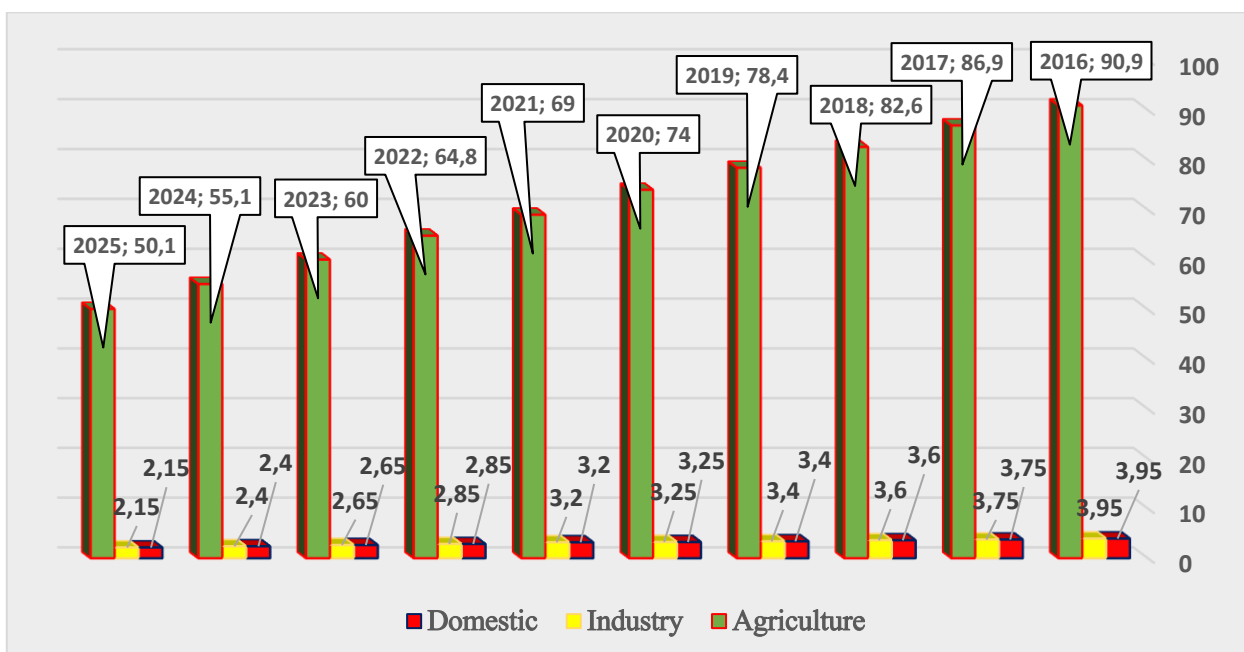


Fig. 1. Share of each sector of renewable water based on the annual estimated decrease of 69 m³ per year "2016-2025" (69= average of 75 & 103 m³) (Source: Study Findings)

water related activities and higher lifestyle standards, more cultivated lands and more industrial activities compared to previous decades. On the other hand, it has been estimated that water per capita in

Iran will continue to drop at a relatively fast pace, even though, the share of each sector will remain the same as it was before. According to the results, the share of domestic sector which is the sector provid-

ing water for tourism, will drop from 3.95 in 2016 to 2.15 in 2025. Nevertheless, this sector has to provide water, not only for itself and the tourism sector, but also for the sectors of commerce and service.

Iran has been using one type of plumbing for domestic section which delivers just drinkable clear water to residential homes, of course, most of the developed countries have two kinds of plumbing which deliver drinkable and undrinkable water separately. This factor alone has a great deal of effect on how much water the domestic section is using now.

Now, in the next step, the rise in tourist numbers including international and domestic is calculated. To do so, we based our numbers on the 15% growth rate designated in the SDP per year for international tourists and a growth rate parallel to population growth, for domestic tourists, although other factors like economic power and economic situation might be involved. For that, all of our scenarios are based on an economic stability, because it is clear that the potential for travel is directly related to the economic situation of tourists. Since the main

objective of the study is to estimate the amount of required water by tourists, then number of tourists in both categories will be multiplied by how many nights they stay on average at their destinations. The result is Person-Night-Stay or PNS. As it has been calculated in government statistics, Iran had 5.2 million international tourists in 2015. The average stay for each tourist is 7 nights, so international tourists stayed 36 million nights in Iran in this year on average.

Based on the 15% growth rate and if those plans succeed, the number of PNS for international tourists will go from 54.6 million in 2016 to 195.7 million in 2025. In the following table also, the number of domestic tourists is estimated based on population growth rate, (1.3% per year based on 2011 census). Also, in this calculation those categories of tourists whose travel has not included night stay are excluded. The average PNS for domestic tourists is 4 nights.

According to Center of Statistics of IR.Iran, in 2013, 60% of travels by domestic tourists resulted in

Table 3

Estimated Number of International Arrivals in 2016 to 2025 based on 15% Growth Rate approved in SDP (Million)

Year	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Number	7.8	8.97	10.31	11.86	13.64	15.69	18.4	21.1	24.33	27.97
PNS	54.6	62.8	72.1	83	95.4	109.8	128.8	147.7	170.3	195.7

Source: Study Findings

Table 4

Estimation of Domestic Tourists Number till 2025 (Million)

Year	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Population	51	51.5	52	52.5	53	53.5	54	54.5	55	55.5
PNS	122.4	123.6	124.8	126	127.2	128.4	129.6	130.8	132	133.2

Source: Study Findings

night stay and 40 % did not. Now that numbers of the average of renewable water decrease per capita, domestic tourists and international tourists have been estimated, the amount of water they need for each year is required to be calculated. For this, it is necessary to consider a scientific based water per capita for direct and indirect water use for tourists. Unfortunately, any official exact or accurate number of water per capita for tourists in Iran was found by this study's researchers simply because tourism is not welcomed as a money making or important sector in this country -due to Islamic laws and political reasons- So the only alternative was to use a scientific international number [19]. Therefore, based on this number, for regions like Iran which has a semi dry climate, with numerous average class hotels and less luxury resorts and accommodation centers, the

amount of 150-200 liters per night is considered to be suitable for direct use of tourists.

The following Per Capita numbers have been used:

1- Direct water use for each tourist is considered to be 150-200 liters per night or 175 liters averagely [19]

2- Indirect water use for each tourist is considered to be between 400-2000 liters per night or 1200 liters averagely [19].

According to the insights of many scholars, the average water use by tourists is always more than the water consumption by local people of host destinations, 2 to 3 times more in other words. So calculations must be done in 3 different scenarios as:

1- In a situation in which water use is stable and the same with local residents.

2- Water use is twice as much as locals, 3- Water use is parallel to global demand growth rate which is 4-8% annually [14].

3- Direct water use per capita for each local resident is 157 liters per night [36].

The Table below shows the per capita alteration in different scenarios. First, the amount of water use for each of the 3 categories has been estimated, then it has been compared to the share of available water for domestic section.

Table 5

Per Capita and the amount of increase in triple scenarios

Per capita (liters)	Growth Rate %	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
175	fixed	175	175	175	175	175	175	175	175	175	175
175	6	185	190	201.4	213	226	239	253	268	280	296
1200	fixed	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200
1200	6	1272	1368	1428	1513	1603	1699	1800	1908	2022	2163
1200	double	2544	2696	2856	3026	3206	3398	3600	3816	4044	4286
157	6	166	178.5	187	192	203	216	228	246	258	272
157	100	332	357	374	384	406	432	456	486	516	546

Source: Study Findings

In scenario 1, the amount of water usage among tourists is considered to be stable and between 150-200 liters which would be 175 liters averagely. Based on this, the amount of water usage among tourists is estimated to be 243 million m³ in 2016 and will rise up to 451 million in 2025.

In scenario 2, water usage by tourists is considered to be twice as much as local residents. According to other scholar's findings, results of this scenario are nearer to reality compared to the other 2 scenarios. The table below shows the numbers calculated based on this scenario. In this case the amount of water usage for local residents is considered to be 157 liters per night with an annual growth rate of 6 %, and usage of water by tourists will be considered twice as much as this; given the 6 % growth rate, water consumption for tourists will face an annual increase each year parallel to local residents usage.

As it is visible in the table, the amount of water required by tourists starts from 515 million m³ and goes up to 1743 million in 2025. This amount is approximately 4 times more than the amount which has been calculated based on scenario 1 while the chances of this scenario happening is more than the other 2. In last scenario a 6 % water consumption growth rate is considered for direct and indirect usage, matched up with global growth rate (4-8 %). The Table below shows the amount of required water by tourists based on scenario 3.

Given the data, it has been shown clearly that in this scenario also, total amount of water needed by tourists was 283 million cubic meters in 2016 and goes up to 798 million in 2025. Water usage wise, scenario number 2 ranks first and number 3 and number 1 will follow respectively.

As it is clear, share of tourism sector of available water is not the same in all 3 scenarios. As the

share of tourism in the first scenario is less than what it will be in the other 2. In this scenario, share of tourism of available water in domestic sector goes from 6.15 % in 2016 up to 19.5 % in 2025.

So the most optimistic scenario would be number 1, and most probably water consumption of tourists in reality will be more than what is estimated based on this scenario. Meanwhile, scenario number 2 shows that the share of tourism of available water in domestic section rose from 19.1 % in 2016 and will rise to 69 % in 2025.

Since tourists usually consume more water compared to local residents, therefore it is reasonable to consider this scenario more likely to happen compared to other 2. Finally, in scenario 3, this share goes from 7.1% in 2016 and is expected to increase to 37.1% in 2025.

Results showed that in scenario 1, domestic tourist's water use is more than usage by international tourists, but in next 2 scenarios and due to longer PNS of international tourists and their rising numbers, the flow will become vice versa. Based on this and considering given theories in this field, above mentioned scenarios aim to explain desirability degree, compatibility coefficient and the degree of feasibility.

While offering scenarios with high compatibility coefficient and ideal desirability, and futurology of the amount of required water in tourism sector in Iran, in case that SDP reaches its goals, the following claims can be offered: Given the unstability of the tourism system in Iran due to mainly political reasons, and also multi-dimensional identity of some of the research variables, in this part, with help of sample community insights and software analysis and after assessing the possibility of each scenarios probability, suitable to situation of

Table 6

The Amount of Water needed by Tourists for Direct and Indirect Usage,
assuming that Per Capita is fixed, Scenario 1, (Million m³)

Year	Per capita		Internationals			Domestics			Sum of both
	direct	indirect	Direct use	Indirect use	total	Direct use	Indirect use	total	
2016	175	1200	9.55	65.5	75	21.4	146.6	168	243
2017	175	1200	11	75.3	86	21.6	148.3	170	256
2018	175	1200	12.6	86.5	99	21.4	149.7	171	270
2019	175	1200	14.5	99.6	114	22.5	151.2	173	287
2020	175	1200	16.6	114.4	131	22.26	152.6	174	305
2021	175	1200	19.2	131.7	151	22.47	154.1	176	327
2022	175	1200	22.5	154.5	177	22.68	155.5	178	355
2023	175	1200	25.8	177.2	203	22.89	156.9	180	383
2024	175	1200	29.8	204.3	234	23.10	158.4	181	415
2025	175	1200	34.2	234.8	269	23.13	158.6	182	451

Source: Study Findings

Table 7

The Amount of Water needed for International Tourists for both Direct and Indirect use,
(Scenario 2)

Year	Per Capita		Internationals			Domestics			Sum of both
	direct	indirect	Direct use	Indirect use	total	Direct use	Indirect use	total	
2016	370	2544	20	139	159	45	311	356	515
2017	380	2696	23	169	192	46	333	379	571
2018	402	3174	28	226	254	50	392	442	969
2019	426	3335	35	276	311	53	420	473	784
2020	452	3535	43	337	380	57	449	506	886
2021	478	3747	52	411	463	61	481	542	1005
2022	506	3971	65	511	576	65	514	579	1155
2023	536	4209	79	621	700	70	550	620	1320
2024	560	4461	95	759	854	73	558	661	1515
2025	592	4728	115	925	1040	78	625	703	1743

Source: Study Findings

Table 8

The Amount of water needed for tourists for direct and indirect water use,
with a growth rate of 6 % (Scenario 3)

Year	Per Capita		Internationals			Domestics			Sum of Both
	Direct	Indirect	Direct use	Indirect use	Total	Direct use	Indirect use	Total	
2016	185	1272	22	155	177	10	84	94	283
2017	190	1348	23	166	189	11	96	107	284
2018	201	1428	25	178	203	14	102	116	319
2019	213	1513	26	190	216	17	125	142	358
2020	226	1603	28	203	231	21	152	173	404
2021	239	1699	30	216	248	26	186	212	460
2022	253	1800	32	231	265	32	231	263	528
2023	268	1908	35	248	284	39	281	320	604
2024	280	2022	36	265	302	47	344	391	693
2025	296	2143	39	284	322	57	419	476	798

Source: Study Findings

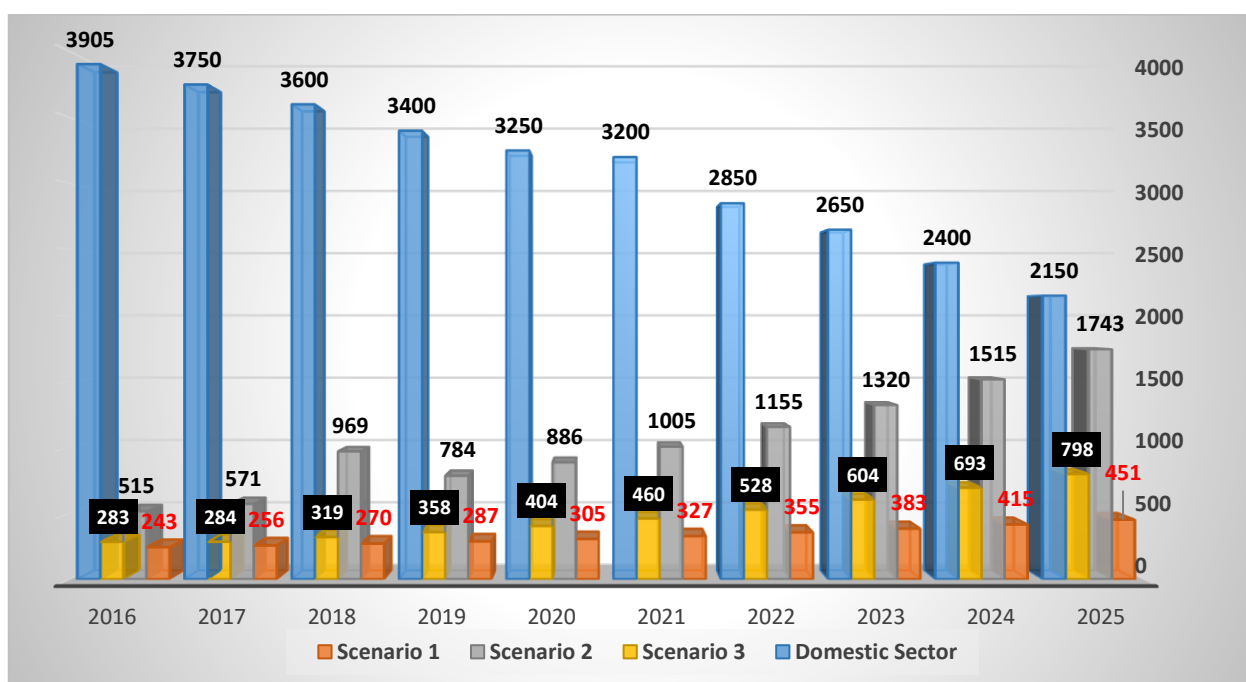


Fig. 2. Share of tourism sector of available water in 3 different scenarios compared to the total share of available water in domestic sector in (2016 to 2025) (Source: Study Findings)

elements related to different scriptors of the research, the objective is to identify 3 states. These states are shown as following: The most ideal

assessed states in scenario framework of ideal credibility is shown in green, semi ideal state is in orange, and finally the worst scenario is shown in red.

Table 9

Assessing the quality of scenarios in estimating the amount of water required by tourists if SDP would succeed

Scenario	Details (2016-2025)	Condition	Quality	Possibility
1	If water consumption amongst tourists would be stable with no rise in rate till 2025, the share of water needed in tourism compared to domestic section will go from 6.15 to 19.1 which is acceptable and not harmful to water resources	Optimal	Green	Low
2	If tourists consume twice as much as local residents, the share of the tourism sector of the total water in domestic sector will go from 19.1 % up to 69 % which is completely dangerous to water resources	Crisis	Red	High
3	If tourists consume water with a growth rate parallel to the international annual growth rate (6 %), tourism share of available water in domestic section will go from 7.1 to 37.1 %	Considerable	orange	Medium

Source: Study Findings

Discussion and conclusions

All types of tourism depend on water in many cases. Iran, on the other hand, due to water shortage and unsuitable administration and management, especially after the Islamic Revolution in 1979, is faced with many water resources related problems. Now, the water crisis has been triggered in 11 out of 31 provinces in Iran.

Plans like SDP and 20YPPT have targeted some goals in tourism and have attended to have the

number of tourist's rise, if these goals are achieved, international and domestic tourist's numbers will rise to twice and three times what they are now, therefore their need of fresh and clean water will follow the same pattern. In this study, the amount of water required by possible future tourists, separately for both international and domestic, has been estimated with the help of statistical tools and methods. Considering the annual decrease of water per capita in one hand, and the possible increase in tourist

numbers on the other, water resources must be the focus point of any plan designed to develop tourism in this country. Domestic sector in Iran has a 4 % share of total renewable fresh water which, based on the results, this amount which was 3.95 billion m³ in 2016, will decrease to 2.15 billion in 2025. Since this 4 % share will most probably remain unchanged, with the numbers of tourists rising, and given the amount of water they use compared to locals, this sector will face inevitable yet increasing pressure to provide the water needs of itself and subsectors like tourism. Nevertheless, the amount of wasted water in Iran's traditional pipelines (uncounted water) is considerable and is estimated to be 18-38% (24% average), this is twice as much as global average. Therefore, whatever water tourists might need now and in the future, providers must add the percentage of waste of pipelines to it, in order to deliver the actual needed amount to the sector.

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Table 10

The Average amount of Water needed for Tourism Sector in 2016-2025 with adding Uncounted Water (Billion m³)

Year	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Net Demand	0.43	0.45	0.51	0.55	0.59	0.64	0.7	0.77	0.83	1
Uncounted Water	0.102	0.107	0.121	0.131	0.142	0.154	0.168	0.183	0.200	0.240
Total	0.530	0.555	0.629	0.679	0.734	0.798	0.870	0.949	1.03	1.24

Source: Study Findings

As can be clearly seen, if tourists for example need 1 billion m³ of water in 2025, providers must provide at least 1.24 billion m³ in order to deliver net demand of 1 billion to the sector.

In conclusion, assuming the share of domestic sector remains fixed, water usage in tourism sector in this 10 year period will create serious barriers on the domestic sectors path to provide water for its other divisions. It must be remembered that Iran is located on the dry belt of the planet earth, also lack of precipitation does not let this country's aquifers renew their resources in a convenient time, and therefore, if the methods of water use in Iran do not go toward sustainable use, this country will face irreparable damages. On the other hand, with the plans to provide water for tourism sector facing failure, all the main plans for tourism development will subsequently fail as well. Results of current study are in contrast with Gossling et al. 2012, by which they have claimed that water consumption in tourist destinations does not surpass 5.5 % of total water use, also it rejects the suggestions offered by

Sorensson & Friedrichs, (2013) through which they conclude that domestic tourists have the most sustainable approach in water usage compared to international tourists.

Results show that after comparing the estimated water needs of future tourists in Iran till 2025, this country-like other tourist destinations including Spain, France, Malaysia, Greece, Netherlands, Uruguay, Poland, Ukraine, etc. - will have to share the total water share of domestic sector between tourists and locals with an even share of 50-50. Whereas most of these countries are categorized among lands with adequate water resources, Iran is a country even currently in crisis based on some water measurement indicators.

Local communities in destinations are the first group who directly feel the pressure of water shortage driven by tourists over use. [9] If tourism development plans in Iran reach their goals, this will force destinations with less water resources to distribute water unequally among locals and tourists in favor of tourists, so local residents will face pressure

and that might begin objections and even chaos. Results show that despite the small number of tourist arrivals in current years, in case of dual plans succeeding, the share of tourism of the total renewable water in domestic sector will be several times more. Nevertheless, in a probable scenario, this share will increase from 19.1 % in 2016 up to 69.1 % in 2025. This certainly will increase the possibility of water

crisis.

As a result, as Tapper et al. (2011) have mentioned, facing water crisis or even water shortage in any destination could damage the popularity of that location [45] and it would result in a dramatic decrease in tourist's arrivals. Integrated water resources management at a national level, forcing all accommodation centers to use less fresh water if pos-

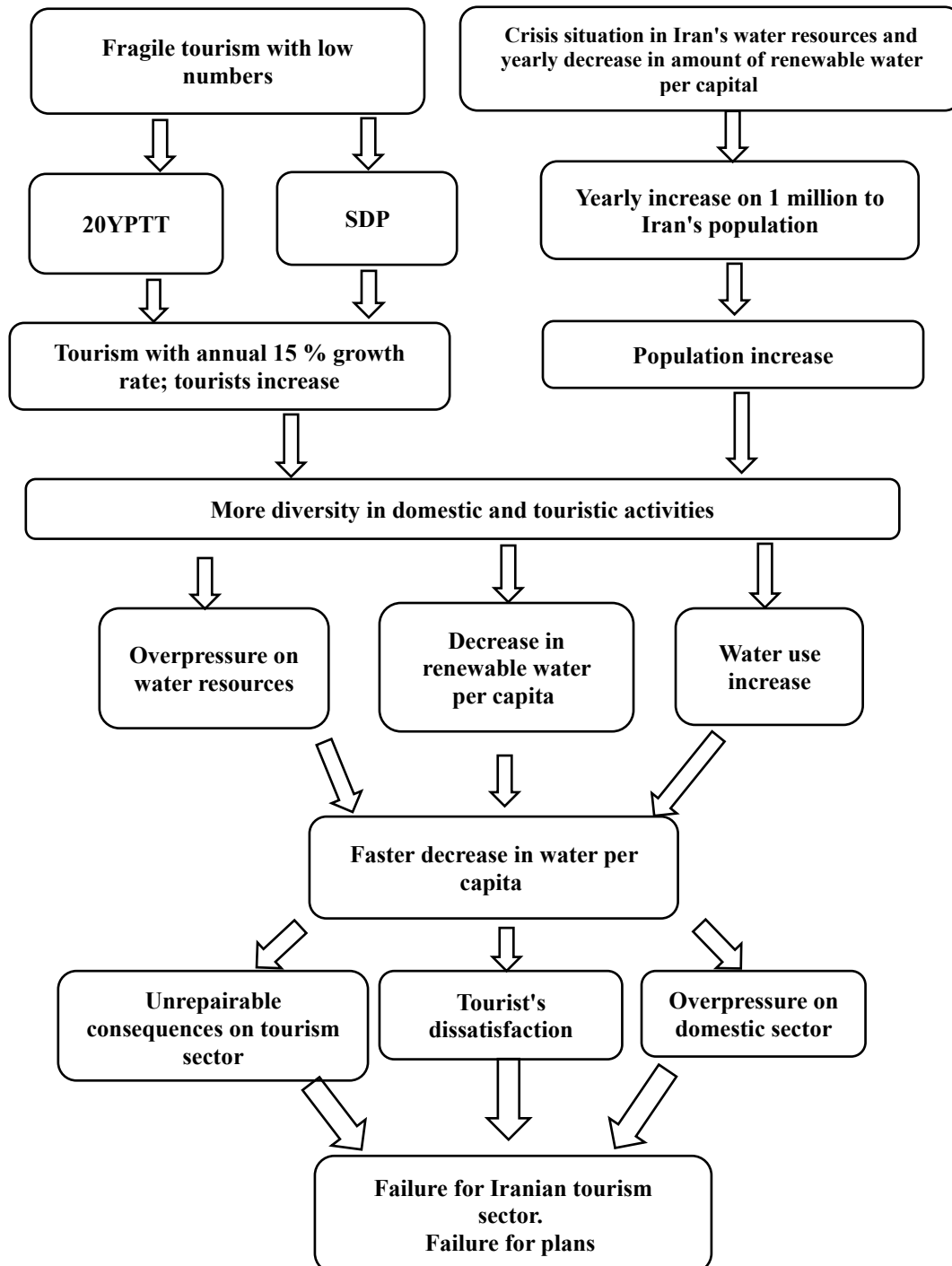


Fig. 3. Conceptual Model of the consequences of unplanned water management in Iran's Tourism 2016-2025 (Source: Study findings)

sible and reuse water for secondary purposes, measuring water use amount, installing another type of pipeline for non-drinking purposes, decreasing the

share of agriculture of total renewable water to the global average (from 92% to 70%), regular educational programs for tourists and local residents in

order to reform the water use approach, making tourists aware of the water situation in Iran and guiding them toward more carefully use, especially in destinations with water shortage, making encouraging and rewarding policies for using less water and taking water purification and reuse tools, can

certainly help both domestic and tourism sectors to use less water and face less problems.

Using the experience of researching this issue on the example of Iran, where they are clearly expressed, the authors plan to consider these issues on the example of not only Ukraine, but also other countries of the former Soviet Union in the future.

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PERSPECTIVES OF THE TOURISM DEVELOPMENT IN TERMS OF WATER CRISIS (CASE STUDY OF IRAN)

The objectives of this paper are to clarify how valuable natural resources associated with tourism industry are; to assess efficiency of the relation between water resources and sustainable development of tourism industry; to promote ecofriendly skills of visitors in order to have an interactive relationship with tourism assets; to maximize economic, social and environmental benefits for both local communities and tourists; to find out the value of Iran's experience with tourism development with conservation of natural resources for other countries, in particular for Ukraine.

Methodology. The research used statistical methods (based on the goals declared in the 20YPPT & SDP plans, Iranian population forecasts, the number of international and domestic tourists in the country is determined before 2025, the amount of water needed for the tourism sector is calculated according to statistics, the amount of available water per capita is calculated and its rate of decline is specified, the volume of water for the domestic sector and necessary for tourists is determined), the study of documents and interviews with experts within Delphi regarding the method of systematic sampling.

Results. The authors calculated the predicted values of the influx of foreign and domestic tourists for the period of 2016-2025 based on goals declared in 20YPPT & SDP plans, Iranian population forecasts. Therefore, 7.8 million foreign and 51 million domestic tourists were expected in 2016, and 27.95 million and

53.5 million, respectively in 2025. The volumes of water consumption in the tourism sector are predicted in three scenarios: water use is stable and the same with local residents; water use is twice as much as that of local residents; water use is in parallel with global demand growth rates of 4-8% per year. According to the first scenario, the share of the tourism sector in water use will increase from 6.15% to 19.5%, according to the second one – from 19.1 to 69% and according to the third one – from 7.1% to 37.1%. The first scenario is defined as optimal, the second one is identified as crisis, and the third is considered. The average amount of water required for the tourism sector, taking into account unaccounted water (from 0.53 billion cubic meters in 2016 to 1.24 billion cubic meters in 2025) was also determined.

Scientific novelty. In the study, based on 20YPIT and SDP plans, the volume of tourist flows in Iran was predicted, the volume of water consumption in the tourism sector in Iran was predicted in three scenarios, and a conceptual model of the consequences of unplanned water management in Iran's tourism for 2016-2025 was developed.

Practical significance. This study explains the nature of the impact of the tourism sector on water resources until 2025, determines the exact amount of water that tourists may need in these years, which makes it possible to make effective decisions by identifying weaknesses and opportunities.

Keywords: water crisis, tourism, Iran, water, water resources, 20YPTT, SDP, domestic sector.

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