Available online at www.ijapas.org

IJAPAS International Journal of Applied Arts Studies

International Journal of Applied Arts Studies

IJAPAS 2(3) (2017) 45–56

Crisis Management in the Persepolis World Heritage Complex (A Case Study about Drought)

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Received 19 June 2017; revised 7 December 2017; accepted 22 December 2017

Abstract

This study tries to present a crisis management plan for the Persepolis World Heritage Site (a case study about drought). The study and data collection procedure is conducted mainly by descriptive and analytical methods. The study population includes the experts of historical places in Department of Agriculture, Natural Resources Department, Geology Department, and Regional Water Department of Fars, among whom 62 people were chosen by using Cochran sampling formula. Their liability for the case study variable of drought was confirmed to be 83 percent, using Cronbach alpha. In this study, the internal and external factors of weaknesses, strengths, threats, and opportunities in this important World Heritage Site were investigated using SPSS software and SWOT method. In this way, drawing a matrix (SWOT) and implementing related strategic analysis, a strategy table including WO, ST, SO, WT has been provided regarding proactive protection. As the next step, putting collective wisdom and consensus of experts and managers of the department were proposed to optimize the designed strategies, to prioritize these strategies, and finally to choose the most suitable one for the aforementioned site.

Keywords: Crisis; Drought; Persepolis; Correct Pattern; Management

1. Introduction

Persepolis was built near the city of Shiraz, in the northeast of Marvdasht, over the hillside of Rahmat Mountain which is located 1770 meters above the sea level. Construction of Persepolis is traced back to 518 B.C, and in 1979 it was recorded as a world Heritage by UNESCO. Among the important issues that have led to researches in this field is that with all risks that threaten this area,

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so far no master plan has been provided as the management plan of Persepolis possible crisis. In this study, we have tried to provide a crisis management plan (before, during, and after the crisis) to identify crisis-generating natural and un-natural factors such as flood, drought, earthquake, visitors, etc. Afterwards, a great emphasis is put on the drought that has caused the greatest threats to this historical site. First, we refer to the literature review in this field of study, and then discuss the factors that may lead to such crisis. Given that the Persepolis complex is located on the hillside of Rahmat Mountain and has the disposal system for surface water, its section can be used as a reservoir for rain. Unexpected events have been very important issues in the last twenty years, causing the death of nearly 10 million people and more than 1,000 billion dollars' worth of damage. Iran also has not been exempted. Iran is the fourth most disaster-prone country in Asia. In different areas of this country, natural disasters such as floods, earthquakes and other un-natural disasters such as traffic accidents, plane crashes, etc. are always taking place. These days, the development of cities have caused factories to move out of the city, water shortages have led to legal and illegal drilling of wells and this has caused excessive growth of agriculture, that, in its turn, led to problems in historical areas such as Persepolis complex, which is located outside the city and faces threats and eventually gradual destruction. In this article, it is tried to identify and introduce the natural critical factors of drought. They include mismanagement of underground waters, mismanagement and carelessness about destruction of plants, lack of appropriate cultivation principles, and lack of attention to gradual destruction of non-mineral compounds of the soil. This study has led to presentation of a crisis management plan of Persepolis (before, during and after the crisis), and all attempts have been directed towards applying some changes in the excessive withdrawal of underground water agriculture principles according to existing map of the wells in agricultural field. The approach of the farmers and ranchers will bring about other consequences like draught, sinking, and flood which may include life and irreparable casualties. The results of the research have shown that when standardized precipitation index has negative sequence, drought occurs, and when standardized precipitation index has one or fewer sequences, droughts are intensified. These time scales state the reaction of drought-in relation to availability of water resources when the reaction of moisture of soil is more short-termed than raining condition. While the response of groundwater levels and river flows and reservoir of water resources is a long-term process in response to the lack of precipitation (Fattahi, 2008).

Since excessive withdrawal of water in deep wells has resulted in intensive decrease in water level, eventually, Khorasan Province has faced with severe water crisis. In this province, based on reports, draught has been introduced as the cause of the water crisis. Whereas in this study, the main cause of the water crisis has been determined to be continuous over drafts by deep wells from aquifers of plains. The decline of groundwater levels in recent years occurs according to the above rule, which has led to the continuation of its decline. The irreparable consequences of the water crisis include: rising cost of pumping water, salinization of ground water, land subsidence, and creation of slots in the surface of the plains and environmental problems (Velayati, 2006). In the study of the design of hydro-geological studies regarding Persepolis World Heritage area, through investigating and studying of groundwater, and performing numerous tests, the possible causes of the water crisis, land subsidence, and flooding in Persepolis were stated, and it is claimed that a sharp drop in underground water level during 2007 to 2009, coincides with the drought which has been unprecedented in 50 years (Naderi et al., 2009). The main objectives include the analysis and modeling crisis management in the Persepolis World Heritage area, and to determine the factors and areas of strengths, weaknesses, opportunities, and threats of crisis management in Persepolis World Series.

1.1. Objective of the Study

Developing a strategic plan to manage the crisis at the Persepolis World Series and its sub-goals are as below:

1. To investigate the relationship between drought and the subsiding of Marvdasht plain and Persepolis World Series
2. To investigate the connection between the landslides and subsidence of Shiraz plains and Persepolis
3. To investigate the relationship between the flood and the subsidence of Marvdasht plain and Persepolis World Series

According to the researches, in addition to solving the problems of the area, helping the endangered historic sites, advertising the culture of familiarizing people with the risks and crises caused by indiscriminate withdrawal of subsurface water, as well as controlling floods and proper cropping patterns are effective steps to improve the situation.

2. Research Methodology

Considering that the subject is both theoretically and practically applicable, after collecting data about the area, we used sample population to accomplish the project. One of the methods is experimental applied research. In fact, after collecting data, the geo-historical information questionnaire was distributed in related departments. The statistical results showed that in fact this method is suitable for this study. This is happening, as its signs are clearly evident in the site. According to the experts, it is regarded as a descriptive-analytic way of data collecting. The population of this research is comprised of experts and managers of Cultural Heritage, Department of Agriculture, Natural Geological Resources, or Archeologists, Agriculture and Natural resources and Regional Water Organization of Fars province, as well as Archeologists, among which 62 people were chosen, using Cochran sampling formula. The reliability of the drought component equals (93%) and is confirmed by Cronbach alpha. This research is carried out using SPSS software and SWOT technique to analyze the statistical data.

3. Research Findings

3.1. SWOT Technique

One of the most suitable technologies for planning and strategy analyses is SWOT matrix, which is now used as a new tool for Gap functions analysis and the analysis of the performances. The design and evaluation of strategies are used. SWOT technique or matrix is used to identify threats and opportunities in the external environment of a system and for the recognition of its internal strengths and weaknesses, in order to assess the situation and to formulate an appropriate strategy to guide and control it. In fact, this approach provides the best strategy for management of the organizations. In brief, what can be said is that the technique for analyzing the situation and formulating strategy are chosen through:

- Recognition and classification of strengths and weaknesses in the system
- Recognition and classification of the opportunities and threats in the environment outside the system
- Competing the SWOT matrix and formulating various strategies to guide the future system

In other words, SWOT model is one of the strategic tools to comply with the opportunities and the strengths and weaknesses of the system, as well as the external threats to the system. The

SWOT model provides a systematic analysis to identify these factors and to choose a strategy that establishes the correspondence between them. In terms of this model, an appropriate strategy maximizes the strengths and opportunities and minimizes the threats and weaknesses. To this purpose, strengths, weaknesses, opportunities, and threats are linked within the general framework of (SO, WO, ST, WT) and strategy options are selected among them.

3.2. Procedures of SWOT Technique

To build a matrix of strengths, weaknesses and opportunities and threats, the following steps should be taken:

1. Identifying the main strengths and weaknesses, and creating evaluation matrix of internal factors (IFE)
2. Identifying the main opportunities and threats, and creating evaluation matrix of external factors (EFE)
3. Designing strategies and creating Matrix of threats, opportunities, weaknesses, and strengths (TOWS)
4. Drawing internal-external matrix (IE)

4. Internal Factors Evaluation Matrix (IFE)

In this step, the main and most important strengths and weaknesses of crisis management are listed, which were collected through questionnaires and interviewing experts and other people involved in the field of historical context and crisis management. In order to identify the impact of each of these factors, according to their opinion, each of the criteria was scored from zero to one, so that the sum of the coefficients equals one. Afterwards, to determine the effectiveness of a standing strategy and reflecting the responses to factors, scores are given as follows: The score of 1 indicates fundamental weakness, the score of 2 indicates the ordinary weakness, the score of 3 indicates normal strength, and the score of 4 indicates a very high strength.

Then, in order to determine the final score, each factor is multiplied by its score. Finally, the final total score is calculated to obtain the final score of internal factors (the final score should not be more than 4 and less than 1). This matrix is a tool to examine the internal factors. Thus, we identify strengths and weaknesses and then put them in the relevant columns. In order to design an internal factors evaluation matrix, typically, intuitive judgment and the views of involved individuals are considered. After identifying the internal factors and the strengths and weaknesses, each factor is allocated a given weight factor of zero (trivial) to one (very important). Normalization can be used for weighting, so that the summation allocated to weighting coefficients should equal one. To determine the importance of each factor, the weight of each factor, and to decide the high or low importance of factors, scholars and experts comments can be used, and then we can normalize the weight factor between zero and one. As it was mentioned above, the status of each factor is stated with a score "rating status quo" and determined to be 1 to 4. Due to the fact that it is very important to determine the score based on status quo, the dominant activities and environment weights must be determined and assessed based on the status quo. Subsequently, the weighted score for each factor is calculated. To do this, the score of each row of internal factors is multiplied by its normalized weight and inserted in a new column, and finally, the sum of weighted points is calculated, so that the minimum is 1 and the maximum is 4 and the average is 2.5. If the final score of IFE matrix in regulatory strategies is less than 2.5, it means that the overall strategy in terms of internal factors is weak, and if the final IFE score is greater than 2.5, it indicates that the

strategy has strengths regarding total internal factors. It is also possible to insert a column in which the reason of selecting the factor is explained and its status quo is analyzed, and the weight and score can therefore be explained. Weight of each factor is determined by a score ranging from 1 to 4. According to the key or the normal internal factors, the strengths and weaknesses are scored based on their scores from 4 to 1 or 2 to 3 to the strengths and weaknesses. Allocating points are calculated in such a way that if the strength was a great one, points 4 and if it was a normal strength, points 3 are given to the agent, and if weakness was a typical one, point 2 and if the weakness was a critical one, point 1 is given to the agent. And also, according to the key or external factors, opportunities and threats, the scores of 4 or 3 are assigned to opportunities and the score of 2 or 1 are assigned to the threats, respectively. Tables 1 and 2 show the results of analysis of the internal factors (strength) and external factors (weakness).

Table 1 Analysis of Internal Factors (Strengths)

	Strong points	Weight	Ranking	Weight score
S1	Location of Persepolis world complex by the side of historical towns in the province such as Pasargadae or historical buildings like Nagsh-e-Rajab Naghsh-e-Rostam , and Estakhr city	0.03	4	0.12
S2	Place and special role of historical context in attracting tourists that is an encouraging factor to increase the motivation of officials and practitioners in the field of attention to crisis management of the context of historical sights.	0.03	4	0.12
S4	Existence of the world complex of Pasargadae and Parse with integrated rocky ground in Fars province.	0.02	4	0.08
S5	Introversion structure aesthetics	0.02	4	0.08
S6	Extroversion and architecture	0.02	4	0.02
S7	Existence of valuable natural elements in neighborhood of the complex and its surrounding like plants and animals	0.02	3	0.06
S8	Business and recreational centers	0.02	4	0.08
S9	Ceremonial center for political and commercial guests	0.02	3	0.06
S10	The tourism development according to the tourism industry and domestic and foreign tourists	0.04	3	0.12
S11	Sufficient space to hold events and seminars	0.03	4	0.12
S12	Passages for the transport and providing services in the event and in time of a crisis	0.03	4	0.12
S13	The possibility of constructing transportation with less degradation	0.03	4	0.12
S14	Empty and usable lands outside boundaries of the complex	0.03	4	0.12
S15	International connections	0.03	4	0.12
Total				1.58

Table 2 Analysis of Internal Factors (weaknesses)

Row	Weak points	Weight	Ranking	Weight scores
W1	Failure to utilize the functionality of NGOs and the lack of community participation	0.02	1	0.02
W2	Dysfunctionality of the visitor management system	0.03	2	0.06
W3	The lack of formulation of hydrological and aqueous space in Persepolis	0.02	1	0.02
W4	Weakness in the legal system	0.03	2	0.06

W5	Weakness in physical protection of the works	0.03	2	0.06
W6	Not using the results of the projects and research projects	0.03	2	0.06
W7	Weakness in the preservation of ancient buried artifacts	0.02	1	0.02
W8	Vulnerability of the relics as a result of industrial activities in the region	0.02	1	0.02
W9	Lack of access to financial resources and income	0.03	2	0.06
W10	Dominance of political relations to the situations in the site	0.03	2	0.06
W11	Weakness of in-service training system for staff and experts	0.03	2	0.06
W12	Weakness in communication beyond the organization	0.02	2	0.04
W13	Low productivity of existing forces	0.02	2	0.04
W14	No crisis management plan	0.02	2	0.04
W15	The ineffectiveness of the legal system of the base	0.02	2	0.04
W16	The lack of stable fixed rules for landscaping around and neighborhood for supervising and administrating	0.02	2	0.04
W17	The absence of efficient regulatory system in surrounding areas	0.03	2	0.06
W18	Lack of understanding about the importance of regional political and executive system regulations and boundaries	0.02	2	0.04
W19	Unavailability of equipment for theft prevention and criminal cases during, before, and after the crisis	0.02	1	0.02
W20	Increase in the number of visitors and non-distribution with good dispersion, lack of any measures for the capacity threshold of historical relics	0.03	2	0.06
W21	Interference of decision-making system	0.03	2	0.06
W22	Increase of the visitors and lack of proper dispersion distribution	0.02	2	0.04
Total				1.04

4.1. External Factors Evaluation Matrix (EFE)

After strategists investigated working and social environment and identified a number of likely external factors, EFE matrix is used to analyze their action. EFE matrix is one of the methods used to organize external factors in terms of opportunities and threats, and a method for analyzing how to respond to the opportunities and threats out of these strategies (in Tables 3 and 4 the external factors of opportunity and threats are stated). The stages of EFE matrix, are like IFE matrix, with the difference that in Table 5, instead of internal factors the term external, and instead of strong and weak points, we propose opportunities and threats, respectively. The process itself is the same as before, like the previous matrix. Note that it is necessary to understand that in threats, if we can manage that effectively, it will receive a higher score, and if we cannot use opportunities effectively, a low score with be assigned.

Table 3 Results of the Analysis of External Factors (Opportunity)

Row	Opportunities	Weight	Racking	Weight score
O1	Management by Board of trustees with appropriate combination	0.04	4	0.16
O2	National efforts to prevent the indiscriminate harvesting of subsurface waters	0.03	4	0.12
O3	Recent laws to control indiscriminate harvesting of subsurface water	0.02	4	0.08

O4	The possibility of non-agricultural employment	0.01	3	0.03
O5	Existence of NGOs and associations of cultural heritage enthusiasts	0.03	4	0.12
O6	The possibility of attracting domestic and foreign investors through international exchange programs	0.04	4	0.16
O7	International and national laws that support Persepolis	0.04	4	0.16
O8	Creation of supplementary charm through timed ownership	0.01	3	0.03
O9	Existence of air transport infrastructure on site (small airport and ...)	0.02	4	0.08
O10	Ability to create and organize promotional incentives such as international conferences, concerts and cultural events to raise public and scientific awareness on different levels	0.03	4	0.12
O11	possibility to create new attractions with the help of advanced technologies	0.03	4	0.12
O12	Possibility of generating more income due to existing potential	0.02	3	0.06
O13	Enthusiasm of worldwide national research institutes to participate in the projects of the site	0.04	4	0.08
O14	National and global positive attitudes to collection	0.04	4	0.16
Total		0.4	48	1.56

Table 4 Results of the Analysis of External Factors (Threats)

Row	Threats	Weight	Ranking	Weight score
T1	Unprecedented decline in groundwater levels(several thousand deep and semi- deep wells and uncontrolled exploitation of subsurface waters)	0.04	2	0.08
T2	Rail and road network development in around the site	0.03	1	0.03
T3	Political crises	0.01	2	0.02
T4	Lack of a department called crisis management in administrative system	0.03	2	0.06
T5	Interference of state ownership on the current activities	0.03	2	0.06
T6	Credit allocation system of the province	0.03	1	0.03
T7	The lack of a centralized system of organization	0.01	2	0.02
T8	Current policies and not introducing new duties	0.03	2	0.06
T9	Inappropriate personal and staff habits at the site	0.02	2	0.04
T10	Weakness in current protection policies	0.03	2	0.06
T11	The threat posed by neighboring villages within reach of many sites	0.02	2	0.04
T12	Inappropriate land use change of agricultural lands (like the city garden) in the neighborhood	0.03	2	0.06
T13	Legal and administrative issues	0.01	2	0.02
T14	Traditional management and administrative cumbersome bureaucracy.	0.02	2	0.04
T15	Industrial development policies.	0.02	2	0.04
T16	Distribution policy and the allocation of funds.	0.02	2	0.04
T17	Cultural conflict	0.03	2	0.06
T18	Active mines and destructive factories (such as stone crusher, Marvdasht Municipality, petrochemical, poultry, etc.)	0.04	2	0.08
T19	The damaging effects of agriculture on the monuments, burning straw, High efficiency, low water use crops, increasing the number of multi-farming in Agricultural products and ...	0.04	2	0.08
T20	Expansion of the development and transmission facilities in	0.04	1	0.04

	surrounding areas of the site			
Total		0.6		1

4.2. Analytical Models and offering Macro and Micro Strategies

SWOT analysis model is a useful and brief analysis of each of the strengths, weaknesses, opportunities and threats that have been identified in the previous step, and it reflects appropriate strategies. Therefore, the matrix always results in four categories of ST, WT, WO and SO. In Table 5, SWOT analysis matrix is shown.

Table 5 SWOT Analysis Matrix

Weakness (W) **W25 to W1**	**Strength (S)** **S1 to S16**	**Internal factors** **External factors**
Competitive strategies (improvement of integral system using external opportunities)	Aggressive strategies (use of capabilities to exploit the opportunities)	**Opportunities (O) O1 to O14**
Defensive strategy (reduction of weakness and preventing threats)	Conservative strategies	**Threats (T) T1 toT22**

A. Strengths strategies of opportunities (SO): This case is the most favorable and the most appropriate for the organization and it means that the organization which makes use of the capabilities and strengths is worthy and reliable. In the context of their interaction it faces appropriate and precious opportunity.

B. Strategies of strength threat (ST): In this case, although the organizations have reliable strengths and abilities, but they also face numerous serious challenges and threats in an interactive environment and their fields.

C. Strategies weakness opportunities (WO): In this case, although a precious opportunity and environment is provided for the organizations, but, on the other hand, serious weaknesses, vulnerabilities, and disabilities surround it. Hence, using the WO strategies they should try their best to compensate for their weaknesses and disabilities using environmental opportunities.

D. Weakness threat Strategies (WT): This case draws the worst, the most difficult and threatening conditions for the activities. Because of the numerous and significant weaknesses and disabilities that the organization faces, it should cope with the pressures, challenges and various threats in its interactive environments or backgrounds.

4.3. Strengths, Weakness, Threats and Opportunities of SWOT

In order to show SWOT matrix and its strategic analysis, the list of WO, ST, SO, WT strategies is provided. In the next step, by using QSPM matrix that has numerical calculations like SPACE matrix, or by using the collective wisdom and consensus of leaders and senior managers to optimize

the designed strategies, we prioritize strategies, and ultimately select the most attractive and best strategy for an organization. In this way, using the SWOT matrix lists of the different strategies that can be obtained in four different groups and in SWOT improved hybrid strategies is also considered and suggested. The strategy matrix SWOT is divided into macro, original, functional, and specific strategies.

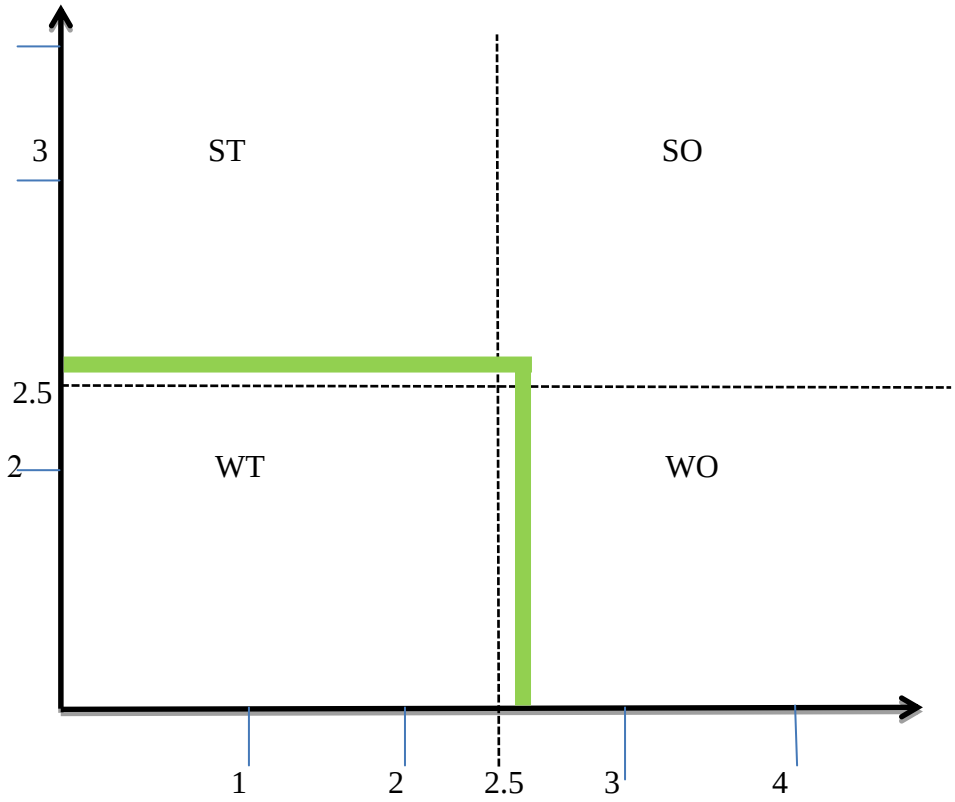

Fig 1 World Collection of Persepolis in Internal - External Matrix

4.4. Strategies

According to the above figure, WT seem prevailing and through using WT strategies it must be tried to strengthen the weak points and minimize our vulnerabilities from the dimension of environmental threats and to minimize our area or if possible, protect ourselves from harm and threats, and to keep away from damages. In this regard, the first step is to complete the master crisis management plan. The plan along with the research projects in the development and use of research results can be very useful. Identification of buried historical relics and launching archeological excavations are some of the requirements of this strategy. It should not be forgotten that formulation of hydrological and water privacy policy of the site should be done in parallel with the aforementioned matters. Obviously, maintaining existing and buried relics, because of their vulnerability, is regarded as the first priority. There is also a bigger possibility of floods, earthquakes and other natural disasters in the area. The existing unprotected relics because of the aging of the buildings are in the risk of loss because of the aging of the buildings. Serious measures must be taken in these cases. This means that the required equipment and prevention of theft and other related crimes during the crisis should be provided. In this way, all cases will be protected. As it was mentioned, deterioration of the protected relics requires it. There exist inefficiencies such as

lack of personnel training system, low efficiency of existing forces, lack of regular monitoring environmental threats, interference, weakness in decision making and administration, which are difficult to solve, but must be dealt with nonetheless. There is also the lack employing the potential of public organizations and a weakness in attracting public association. Numerous management on site resulted in previous weak legal system and still continues its deficiency. And on the other side, there are recruiting and appropriate distribution of monitory resources, inefficiency of the observers' management system and distribution with appropriate scattering. Overcoming political relations over the privacy policy available on the site, lack of efficient monitoring system on environment and lack of understanding of the political and administrative system in the area with crucial importance of internal factors are some of the important internal factors that must be resolved. Of course, the importance of considering the current situation is undeniable, this means that the threats should be prevented, or their likelihood of occurrence reduced. The above mentioned weaknesses must be overcome to provide the possibility of preventing threats, including unprecedented decline in groundwater levels of several thousand deep and semi-deep wells, excessive harvesting of subsurface waters, development of rail and road network in surrounding areas of the relics, political crises, vandalism, interference of state ownership on current activities, credit allocation system of the province, lack of centralized system of organization, the lack of introduction of new tasks by current policies, unfit habits and personal strength of staff, poor security policies, the threat posed by neighboring villages within reach of many of the relics, change of land use of agricultural fields and inappropriate land use system such as urban garden in the area, developmental projects such as the master plan, detailed policy evaluation and rural plan development, legal and administrative issues, traditional management and cumbersome administrative bureaucracy, industrial development policies, distribution policy and the allocation of funds, cultural conflict, active mines and destructive factories such as municipal stone breaker of Marvdasht, petrochemical, poultry, etc. The damaging effects of agriculture on monuments, cultivating high water use product with low efficiency, increasing multi-use of agricultural products, etc., have violated the perspective privacy, enhancing the development and transmission facilities in the surrounding. Next is avoiding the threats and exploiting the opportunities. Using WO strategies, we should do our best to compensate for the weaknesses and disabilities by the use of environmental opportunities. These opportunities are as follows:

- Management of board of trustees with the right combination
- National efforts to prevent the indiscriminate harvesting of subsurface waters
- Recent laws to control indiscriminate harvesting of subsurface water
- The possibility of non-agricultural employment
- Existence of NGOs and associations of cultural heritage enthusiasts
- The possibility of attracting domestic and foreign investors through international exchange programs
- International and national laws that support Persepolis
- Creation of supplementary charm through timed ownership
- Existence of air transport infrastructure on site (small airport and so on)
- Ability to create and organize promotional incentives such as international conferences, concerts, and cultural events to raise public and scientific awareness on different levels
- Possibility to create new attractions with the help of advanced technologies
- Possibility of generating more income due to existing potential
- Enthusiasm of worldwide national research institutes to participate in the projects of the site
- National and global positive attitudes to collection

The next step is to get the most of valuable opportunities to employ the existing environment with devoted efforts. This means using the power of organization to exploit the opportunities.

- The presence of a suitable space for the sake of holding events and seminars
- Having a total impact of important monuments and being recorded as world heritage
- Existence of buried Monuments
- Existence of discoveries of the museum
- Presence of experts and skillful specialists in the domains of security, repair, archeology, and architecture
- Presence of money resources such as selling tickets, service possibilities, environmental advertisements
- Existence of researches, studies, documents in the domain of the site
- The existence of financial and scientific infrastructures
- Existence of international relationship
- Existence of bare and useable lands
- The possibility of creating transportation system with less destructive effects
- Existence of passages to provide help in the case of emergency and crisis

5. Conclusion

In the subjects of drought crisis, the results of the studies reveal the lack of proper planting and irrigation methods, resulting from the fact that the residents still follow the traditional method. While digging wells per day dramatically increased, first semi-deep wells turned into deep wells. Water withdrawals from aquifers has increased as compared with the past, due to population growth and agriculture industry, and use of high water consuming products has led to a faster waste rate of groundwater, and about this, no action was taken until years 2014 to 2015. In fact, 78 percent of the water was wasted, which led to the banning of digging wells in the range. Currently, approximately 7000 illegal wells exist in the regions that are still being used. If a water crisis occurs, it won't be long before we're faced with a period of drought. It must be said that due to uncontrolled exploitation of groundwater, as an earlier problem, waters eject out of the layers by pumping pressure, creating a gap between the layers; hence, the layers of dust fills this distance, and the base of the plain declines from the top and finally the plain sinks down. This issue happened to a large extent. Therefore, the results indicated that the drought crisis with 58.04 percent has the most destructive effects on the Persepolis.

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