The Strategy of Compensating Land Pollution in Light of Using ECPs for Recovering Urmia Lake in Iran


ABSTRACT

Emergence of different crises in the consumption of energy and water, environment pollution, food, and instability of market all indicate that new strategy development methods must consider more complexity and variety. Urmia Lake as one of the largest saline lakes of the world has faced serious challenges due to unwise decisions and exploitation. Solving this problem requires a national effort and strategic planning which while identifying potential critical points, predicts and develops solutions taking cost, time, and necessity of continuous revision into account. Therefore, it is necessary to develop strategic plans in a way so that it is always possible to revise them. This necessity of revision and restructuring is the main cause of inclination toward cellular planning. The present study claims that employing era-based cellular planning, regarding its capability in continuous revision of solutions, is an appropriate tool of strategic decision-making for solving national crises and attaining sustainable development.

Key words: Strategic Management, Era-based cellular planning, Robust Planning, Monitoring opportunities.

Introduction

Recent events of the world refer to the fact that previous methods are no longer effective and efficient. The trends of change in the structure of population, combination of inter-cultural approaches, emergence of different crises in the consumption of energy and water, environment pollution, food, and instability of market all indicate that new strategy development methods must take complexity and variety more into consideration. In fact, the continuation of life in future world requires simultaneous attention to four rules of necessary variety, necessary complexity, necessary stability, and necessary flexibility. Following these rules, while providing flexibility against changes, helps preserve the stability and character of the system and confront with environmental complexity and variety more efficiently. Therefore, strategic management of future must provide flexible capacity for confronting increasing complexity and variety of the environment to preserve its stability and validity [13].

The major trends making future world instable include:

1. Outburst of new technical knowledge and innovations;
2. Emergence of post-industrial economies and governmental structures on the basis of information, knowledge, and services;
3. Integration and globalization of businesses, strategies, cultures, and environmental issues;
4. Demographical and cultural changes of societies toward growing varieties and potential conflicts;
5. Decline of public trust level in institutions traditionally structured to adapt with the consequences of these challenges [5];
6. Growing destruction of environment as a result of industrialization and increase of the world population, in general.

Hence, considering the changes which are likely to occur in these six important aspects of social life, it is not possible to develop strategic programs once for all. For, by any change in each of these six aspects, the strategic plans must be modified.
accordingly. In this way, any small or big change, relative to its time and place, might impose different consequences on society.

Thus, strategic programs are recommended to be developed in way to make it possible to modify them at any time. The necessity of modification and restructuring is the main reason for tendency toward cellular strategic planning, because cellular planning allows removing, improving, restoring, or replacing some cells at any time [13].

Urmia Lake in Northwestern Iran is the largest inland lake of the country and one of the largest saline lakes of the world (613 253 ha). This lake is one of the most important and valuable aquatic ecosystems in the country. About 550 plant species, including unique Artemia Species have been recognized within its ecological zone, and the lake is marked by more than one hundred small rocky islands, which are stopover points in the migration of various waterfowl (including flamingos, pelicans, spoonbills, ibises, storks, shelducks, avocets, stilts and gulls). Because of its unique natural and ecological features, the lake has been designated as a National Park, Ramsar Site and a UNESCO Biosphere Reserve (CIWP, 2008).

The lake basin, as a unique socio-ecological region, has faced extreme water shortages in recent years due to the poor water governance as well as climatic changes. Because of the intense agricultural development and rapid urbanization, the groundwater level in some parts of basin has decreased up to 16 meters. According to Alesheikh et al. (2009), the area of Lake in 1998 and 2001 equaled to 5650 and 4610 square kilometers, respectively. Therefore, its area has decreased about 1040 square kilometers from August 1998 to August 2001. The water level of the lake is now less than about 3 meters of its average and its critical level. The lake requires a minimum inflow of 3 billion cubic meters per year to compensate for annual evaporation. The decrease in water levels is leading to an ecological disaster in near future.

In addition to former bad governance instances, a large highway project is constructed to facilitate transportation between the eastern and western cities of the lake. This is while most of the rivers flow into the lake from the south, so the causeway has changed the normal circulating regime of the lake, resulting in many ecological problems.

Long-term vision of the lake stresses that it will have adequate water to sustain an attractive landscape and rich biodiversity where people and local communities can make wise use of its resources, and will enhance cooperation between the involved provincial organizations (CIWP, 2008).

The local and national organizations have now planned to maintain this worse condition. One of them is through using inter-basin water transfer projects, which has been already successful in some cases. Therefore, several water transfer projects are proposed to partially conserve this drying lake. In one of these transfers, four different routes are defined and the aim of this study is to evaluate and then select the best route.

However, the salinity of Urmia Lake has increased dramatically to more than 300 g/l during recent years which have greatly influenced almost all aspects of the lake.

Population genetic studies carried out by Eimanifar [7] showed that the southern area caused most differentiated populations and the southern and median areas of the lake have relatively high genotypes (composite haplotypes) distribution as compared to the northern area.

The possible causes of rising salinity are likely to be surface flow diversions, groundwater extractions and inappropriate climatic condition. About 4.4 million people live in the Urmia Lake basin, whose irrigation economy is strongly dependent upon existing surface and groundwater resources in the area [18]. Accordingly, human population growth in the lake's basin has seriously increased the need for agricultural and potable water in recent years, all of which are supplied from surface and groundwater sources in the area. Based on it, solving Urmia crisis and recovering the lake needs to a strategic planning which consider the nature of threats and opportunities and impact of human activities.

The increasing growth of population and promotion of level of human knowledge in exploiting natural resources resulting in increasing consumption of resources, have complicated the situation of the earth [11]. Exploitation and destruction of natural resources will undoubtedly challenge the future of human being, so healthy water, air, food, and proper place to live may become unattainable wishes [8]. Experts use the term sustainable development in order to find a development-based solution with lowest level of negative results. In this pattern, human, while exploiting nature decreases the amount of destruction and pollution as much as possible, and in the most optimistic condition, restricts it to the tolerance level of the environment. Strategic Environmental Assessment (SEA) is one of the acceptable methods of achieving the goals of sustainable development through which strategies, policies, plans, and programs are environmentally assessed in a regular and expansive manner [2]. Following environmental rules related to strategic decision-making and policy-making is a basic requirement of economic, social, and cultural sustainable development, so in recent years, SEA is addressed as an important tool of decision-making and policy-making in different aspects of administration [4].

In this respect, considering the importance of national strategic decisions, decision-makers and strategic managers must be able to prognosticate problems before occurrence and prepare themselves
for confronting them. For a long time, the necessity of using scenario-based strategic plans has been addressed in classical texts. This type of planning is used due to multiplicity and unpredictability of future [12]. The advantages of this method are the ability of identifying far futures very different from present time, and developing scenarios for selecting strategies on the basis of this knowledge. However, scenario-based planning, as used in practice, lacks a systematic basis for comparing short-term strategies [9]. Besides, robust planning systems can also be used. Robust planning has especially challenged the traditional paradigms of strategic planning [19]. This challenge results in a paradox through which a strategic outlook is planned for distant futures, although it is not possible to predict the future [9]. However, it seems that while observing precautions, new scientific capacities are required for a deeper penetration into future era. Era-based cellular planning has provided this capacity through connection to local and regional knowledge networks, data processing and protection bases, and online networks connected to local data-bases [15].

Nevertheless, the environment is being continually destroyed the main cause of which being the activities of human societies. This crisis is so serious and disappointing that in a superficial look there seems no solution for it, but it is possible to at least prevent pollutions and pass these resources to next generation through a more responsible approach.

**Materials and Methods**

This paper is categorized as a descriptive research due to collecting required data and to its methodology. The method of the research is descriptive-analytical based on the content analysis. The Content analysis method seeks for highlighting the main aspects of a subject, besides its goals is to analyze, define and represent the realities. This research in terms of orientation is fundamental and regarding the purpose, is an exploratory research. The paper has a qualitative nature as well.

The research consists of various kinds of qualitative data such as talking, observation, interview, general reports, daily hand notes and interactions and thoughts of researcher. In this study, the main method of data gathering is in-depth interview with experts. Primary interviews are conducted in an unstructured format. With respect to preliminary interviewees’ responses and codifying primary interviews, questions were slightly changed. Even though all previous questions were related to the main subject and main questions.

The statistical populations of the research are experts of biological scientists who have a complete understanding of Uromie lake and they are familiar with strategic planning. Our sample consist of 56 experts that chosen by snowball sampling. For an exploratory, qualitative and descriptive research, which respondents are few in number, snowball sampling is highly recommended. Snowball sampling is defined as a technique for finding research respondent. One respondent gives the name of another respondent to researcher and this procedure goes on [3].

**Results And Discussion**

Within the comprehensive approach of strategic management, strategy development is a step-by-step process and specific instructions are determined for each step. Techniques such as SWOT, BCG matrix, and SPACE strategic position evaluation matrix are employed [16]. This approach considers future condition as the linear continuation of present condition; therefore, it is efficient only in an environment with slow and low changes. It restricts the mind to a step-by-step process and is a great barrier for creativity and encountering ambiguities and complexities [1]. Most experts believe that strategy is related to cause and effect discussions and belong to the area of sciences, rather than logic, so step-by-step and predetermined processes cannot guide us toward correct strategic decisions. A new, creative, and effective strategy is not necessarily the result of systematic methods. If we are to reach a destination different from today's situation, we must select a new path and employ modern techniques to guide us toward a distinct destination [10].

Era-based cellular planning is a kind of planning which makes dynamic the knowledge capacities provided by the tools of strategic planning and allows collecting various skills and knowledge and developing scenarios on the basis of the highest amount of information through the quickest methods for enabling and developing robust planning systems. This provides the possibility of combining dynamicity, flexibility, stability, and robustness. The main feature of Era-based Cellular Planning System (ECPS) is the possibility of using potential and actual knowledge capacities throughout the world.

Cellular planning associated with a set of other cellular plans forms numerous planning packages. Sometimes, these cells are completely independent from each other, and sometimes they are related to each other. Some of these plans are administered at present age and some others in future. Thus, it is possible for the planning packages to consist of the plans of one age or numerous ages. The packages involving the plans of one age are called horizontal package of plans, and packages consisting of the plans of successive or alternative ages are called vertical package of plans (Fig. 1). Management of horizontal package of plans seems easier since managing vertical package of plans requires higher levels of intelligence and accuracy [13].
It appears that confronting the expansive and growing crises of environment pollution requires a kind of collective will and effort. This managerial system is the consequence of understating emergencies in decision-making. In this system, decision-making capacities and information required for each specific issue are provided in a place before the meeting. Then, the decision-making group with different members and various expertises (Fig. 2) are called for making decision about the given issues so that the decisions are made in the shortest time with highest quality and accuracy. It must be mentioned that consideration of the nature of connections of each plan with others helps better understating of successive consequences of each action. This shows the capabilities and weaknesses of the system against environmental opportunities and threats to provide the possibility of optimization of the processes and decision results.

As it is seen, the think tanks, administrative institutions, legislation systems, subsidiary watching networks, and especially policy support systems propose their information, improvements, and suggestions to central watching system. In the ideal situation, this system can continually use the services
of data-bases connected to foreign networks. Also, it must be considered that information flow is the life vessel of this planning system. The information is particularly important in developing the performance of watching sub-systems. Watching sub-systems can change the combination of plans of the given age and subsequent ages if necessary; thus, they can have a major effect upon the desired performance of the system.

In era-based cellular planning system, a hierarchy of cellular plans is considered that must be administered in appropriate time. Of course, long-term plans cannot be designed at once and passed to the administrator. In era-based cellular planning, the planning and administration stages are combined and the possibility of continuous revisions and evaluations is provided in successive professional and human generations.

As it is indicated in Fig. 3, considering the action sheet and design and administration watching sub-systems makes the trend of revision in targeting, designing, and administration of plans manageable (Fig. 3). When planning for complex social systems at national level, each action sheet is changed into a large and complex dashboard which, if proper information systems and equipments are used, enables planners to get informed from the state of administration of plans in national outlook.

In such a dashboard, all elements of each matrix related to each age are inspected in a row or horizontal line. Hence, the plans of successive ages can be observed, all plans of previous and later ages are accessible and the state of administration and removal of the plans can be inspected. In this way, planners and experts can made committed to proper administration and systematic follow up of the plans. So, the final outlook of the country must be manifested in age Z [14].

![Fig. 3: Spread Dashboard of Planning in National Scale [13]](image)

Therefore, watching sub-system must be connected to all networks affecting the processes of knowledge production and distribution. Otherwise, it faces stagnation and dormancy encountering new problems which are not based on our knowledge. Thus, neither knowledge from present set of knowledge can be sufficed, nor a sufficiency level can be imagined for this need. In this respect, watching system must rely on a collection of interdisciplinary and multidisciplinary findings and challenge human knowledge by presenting new issues and formulate scientific answers within the framework of potential scenarios for facing each critical or problematic situation.

In this network, an infinite number of plans are designed in an infinite number of ages which are symbolically listed here from A to Z. If the vertical package is considered as "harnessing salt in Urmia Lake", it is observed that administering this plan requires a set of primary actions; for instance, if cellular plan A12 is devoted to "studying environmental factors stabilizing the lake", B28 to "drainage of the rivers flowing into the lake", F76 to "developing water resources flowing into the lake", I33 to "developing natural resources", and J98 to "restricting the ecosystem for returning wild life to the lake", successful administration of cellular plan E44, i.e. "harnessing all waters flowing into the lake" depends upon successful administration of A12, B28, C164, and successful administration of I33 depends upon the success of E44. Besides, the effectiveness of H16 project is dependent upon the completion of E44. While this project could be administered without
completion of E44, cellular plans I33 and F 76 could not be administered before E44. In this way, the progress of each plan might significantly affect the progress of other plans (Fig. 4).

![Diagram of hard and soft links](image)

**Fig. 4:** Sample of hard and soft links

**Conclusion:**

The appropriate system for strategy development in future must be a flexible one relying upon the continuous flows of knowledge and information. It must be able to perceive the difference occurring in the state of local and regional networks and adapt itself with the various needs of these regions. Therefore, the use of ECP is considered so that the possibility of using advanced learning systems is provided by equipping it with information obtained by GIS and expansively monitoring land and human capabilities, as well as inspecting occurring changes.

These systems, by developing Strategic Support System (SSS) and Policy Support System (PSS) prepare the ground for maturity of developed and administered strategies. Through this approach, using the metaphorical concept of collage [6], the strategist can be imagined as an artist who is continually creating strategy, or changing and modifying the pre-existing ones. Provision of this condition requires use of extra-intelligent capacity of watching sub-systems connected to think tanks and local as well as international knowledge networks.

This study, considering the possibility of using this planning system for facing environmental crises, investigates the possibility of rationally confronting the environmental crises of Iran.

The Urmia Lake of Iran is at the verge of destruction for being exposed to a variety of environmental damages. This lake which was previously the settlement of many animals has gradually changed into a ruin in such a way that even expansive crises can be predicted in the area in case of salt storms. These crises can change a large part of this environment into desert.

The following strategies can be taken into account for recovering Urmia Lake based on ESP model.

1. Directing free waters toward the lake;
2. Controlling the pattern of industrialization and building dams around the lake;
3. Fructifying clouds for raising water level of the lake;
4. Restructuring the ecosystem for recovering the wildlife, particularly returning the waterfowl;
5. Preventing devotion of lake water to agricultural activities;
6. Restructuring Artemia reserve for preventing excessive salinity of lake water.

It is observed that this set of activities cannot be planned and administered in a short period of time; therefore, era-based cellular planning systems are set for administration in successive ages. One important feature of this system is that the content, priorities, or hierarchies of administration of plans and their structures can always be revised. Thus, beyond generation plans are not imposed to future generations and each generation can redefine the content and structure of the plans according to innovated technologies of their age to structure future environment with minimum cost and maximum efficiency.

**References**


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