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Systems Approach in the World Heritage Site Bahá'í Gardens

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The Bahá'í religion is the world's youngest religion, founded in 1863 by the Persian sage Baha'u'llah. Its followers, including its founder, were persecuted for more than a century until they found peace in the 21st century when its two centres in Haifa, Israel, became UNESCO World Heritage Sites in 2008. The research aims to put the principles of systems thinking into practice in the case of the conservation of the Bahá'í Gardens, a World Heritage Site. The data for the causal-loop model (CLD) within the system dynamics framework, which we present in this paper, was obtained through a field survey of leaders of the Bahá'í religion. The theoretical model is followed by a practical demonstration of the functioning and management of the Bahá'í Gardens in harmony with the social environment, the natural surroundings, pilgrims, and tourists, which illustrates the interplay between theory and the practical application of systems thinking for the highest good of world heritage and tourism. The research goes further by presenting, through the literature, the possibility of integrating religion and science, which as independent systems, are linked by a systems approach. The essence of Bahá'í thought is compassion, equality of races, interdependence, harmony, and living aesthetics and symmetry. All these elements fit into the modern systems' principles, where systems cannot work until all their interdependent elements are balanced. The feedback loop and one's awareness of it bring balance to the system, which presents the systems approach as a valuable tool in modern science.

Keywords: Bahá'í Gardens, systems approach, CLD modelling, UNESCO, world heritage site, pilgrimage tourism

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Introduction

The Bahá'í faith began as a local religious movement in late 19th century Persia and is the youngest of the independent world religions. Today, the Bahá'í religion has more than 8.5 million followers, and is one of the world's fastest-growing religions and probably the most diverse. The religion has only eight centres worldwide, one on each continent and the two main centres in Israel. Many Bahá'ís converted from other faiths, and its members come from different religions, races, ethnic backgrounds, and nationalities (Hartz, 2009). As their faith forbids prejudice of any kind, they work together to break down prejudices and build a harmonious, balanced global society. Balance is also an essential feature of every living and non-living system: soft systems such as an individual being, global or local community, and complex technical systems. Modern society, which promotes sustainability, underlines corporate social responsibility, but this cannot exist if one does not include an individual's responsibility. The Bahá'í religion emphasizes individual responsibility and personal development

in a physical and a spiritual sense. People must not only satisfy their basic physical needs, but must also recognize that to be truly happy is to develop their spiritual (non-visible) side (Hartz, 2009). The nature of Bahá'í faith and thought is systems thinking. Bahá'í texts intertwine with systems principles in the natural environment and sustainable soft systems such as successful companies, organizations, and societies. Some basic Bahá'í principles of physical and spiritual development go well with basic systems thinking since the religion considers all living systems, including flora, fauna, and human races, as parts of nature. This paper uses the term systems thinking, which is nothing more than sustainability thinking. All living systems strive for equilibrium or homeostasis, so systems thinking is about the stability of a system's elements. In the same way, sustainability thinking is thinking in terms of balance and equal use of the resources that are part of a system (nature or an organizational system). For this paper, we have chosen to use systems terminology for the most part.

Systems Methodology

Systems methodology includes methods of expert systems, causal loop modelling and simulations, thinking and system dynamics. Jay Forrester initially developed System dynamics (Forrester, 1961) and Wolstenholme (1996) describes it as a five-phase systems thinking and modelling process in which phases are interrelated and followed by a causal loop model (diagram). The steps go as follows:

1. problem structuring,
2. causal loop modelling (causal loop diagrams, CLD),
3. dynamic modelling,
4. scenario planning and modelling, and
5. implementation and organizational learning.

In our research, we set the analogy of Bahá'ís' way of thinking, living, acting, and systems thinking as a first step. The data we received helped us to go to the second step; we built a causal loop model (CLD), where we identified the main variables and developed a causal loop model to illustrate the relationships among the variables and discuss their behaviour. As we have focused on building a qualitative model to represent Bahá'í systems thinking, we have omitted the third step, i.e. making a simulation model, which is unnecessary for our research. Instead, as the fourth and fifth steps, we have presented the world cultural heritage of the Bahá'ís and its regulation in the context of tourism, which fully follows the modelling process and systems thinking principles (Anderson & Johnson, 1997).

Method of Systems Thinking

Systems thinking is a framework based on the belief that we can understand a system's parts in the context of a relationship with each other and other systems rather than in isolation (Capra, 1997). Systems thinking principles (below, in italics) complement the five-step modelling process described in systems methodology: (1) Problem structuring (*The Big Picture* or from the point of view of a whole, long term), (2) Causal Loop Modelling (complexity, *interdependency,* qualitative – *non-measurable data*) (3) Dynamic modelling (dynamics – *measurable data*) (4) Scenario planning and modelling (*short and long-term* scenarios), and (5) Implementation and organizational learning (*we are a part of the system*). Systems thinking is, at its core, a natural way of thinking. Our planet is a large system made up of nature with its living systems, technology with its technical systems, and consciousness as an evolutionary system. Aristotle spoke of systems and the systemic whole (when both contained and container are parts of the same whole, the whole may be said to be, since we can also say of the whole what is true of the parts) when he discussed the parts and the whole, and observed nature and things (Waterfield & Bostock, 1996). But throughout the planet's evolution, only people closely connected to nature, who have observed its cycles and learned from nature have thought systemically. The thought of Eastern civilization is based on nature as a system within which humans are also a part. Western civilization thought has gone its own way. It began to divide and to see the parts as the ones to focus on. As a result, systems thinking did not emerge as a leading way of thinking in Western society until the 19th century, when philosophers and mathematicians came to discuss systems,

the relationship between the whole and its parts, and the human as a system (Hegel, 2008; Chardin, 1955; Peirce, 1998). However, it was not until the Austrian biologist Bertalanffy expressed systems thinking in his manifesto *General System Theory* (Bertalanffy, 1951) that the systems way of thinking came to wider social acceptance. From then on, systems thinking began to take hold in the Western world, and several works dedicated to the different models and methodologies, systems, and system dynamics arose. These include *Industrial Dynamics* (Forrester, 1961), System Thinking (Senge, 2006), Systems Theory (Kljajić, 1994), *Systems Thinking, Systems Practice* (Checkland, 2005), *Thinking in Systems* (Meadows & Wright, 2015), *The Tree of Knowledge* (Maturana & Varela, 1992), *Living Systems* (Miller, 1978), 'The Viable System Model' (Beer, 1984), and *Anticipatory Systems* (Rosen, 1985), as well as others. In practice, systems thinking is an upgrade of linear-analytical or conventional thinking, where one thinks about parts and what one sees. On the other hand, systems thinking achieves its upgrading in a feedback loop or the awareness that there are also elements that are not visible but are crucial for the harmonious development of society and the individual. These elements are thought patterns that are not visible but are part of human evolution. In modern times, many old thought patterns no longer serve a purpose. It is good for humanity to recognize them because they are becoming unnecessary and harmful. This recognition is a point where one can start talking about systems consciousness. An individual's, and later the society's, systems awareness, which leads to co-creativity, rather than competitivity, and must take into consideration the principles of living systems as brought out in Haines (2006): system clarity first; the whole is primary; understand systems holistically in their environment; each system functions uniquely; system purposes first; the role of parts – to support the whole; all parts are interdependent; small changes produce big results; maximizing parts sub-optimizes the whole; causes and effects are not closely related; faster is ultimately slower; feedback loop; multiple goals; flexibility; natural hierarchy; entropy; and tendency to run down. A system cannot be understood by analysis but by synthesis, looking at it within its environment. With systems consciousness (not just knowledge) as a guiding mindset, social dynamics begin to circulate in a way that achieves synergy, connectedness, and interdependence with each other and nature. Through the example of the Bahá'í Gardens of Haifa, we will present the systemic consciousness of the members of the religion, who have achieved environmental symmetry through their thinking and work, and who represent an example of a systemically (sustainably) oriented tourism that, despite the increasing numbers of tourists, maintains the UNESCO World Heritage Site in balance with its social surroundings and physical environment.

Bahá'í Gardens and its Sinergy with Social Surroundings and Physical Environment

The International Bahá'í Community has been registered with the United Nations as a non-governmental organization since 1948. The Bahá'í Faith offers an advanced set of social teachings that teach how to think in systems. The individual's responsibility implies a commitment to the whole, in this case, Bahá'í society, whose approach to tourism reflects the system's qualities. These qualities – awareness of interdependency, connectedness, dynamics, big picture point of view, and feedback effect – lead the Bahá'ís to behaviour such as generosity, honesty, truthfulness, humility, and selfless service to others and nature. They are aware of their essential role in society, the economy, the environment, and tourism.

The terraced gardens of Haifa represent the synergy and symmetry of beauty and spirituality. They have a rich history linked to the founder of the Bahá'í Faith. When Baha'ullah came from Acre to Haifa, he pitched his tent and camped on a mountain whose name means God's vineyard – Mount Carmel (Worthington, 2011). Today, a tourist might say that these gardens are beautiful for their symmetry and spiritual peace and tranquillity that can be felt when walking on the terraces. The Bahá'í community has built them with love and care. The idea began in the early 20th century with the construction of the first shrine. The structure of the gardens was completed in 1999 and opened to tourists the same year. The photo below shows the terraced gardens in the evening light angled

from German Colony Plaza up to Mount Carmel. The Bahá'í Gardens show the symmetry and the aesthetic of the WHS, which evokes in the modern tourist a desire to participate emotionally, intellectually, and psychologically in this experience of beauty (Sedmak & Brezovec, 2017). There are 450 plant species in the gardens, and the vertical rise of the terraced gardens in Haifa is 225 metres long. Altogether, the gardens have 1,206 steps, and annually about 1 million tourists and visitors. In the middle of the hill, one can see the Shrine of Báb, a prayer site for pilgrims. The Shrine is open to tourists and visitors only in the morning and not every day. Image 2 shows the Universal House of justice, a seat of the Bahá'í administration, and image 3 shows the terraced gardens from the German Colony Plaza, the bottom of Mount Carmel, up, in the evening with the distinctive aesthetic of the light.

Bahá'í Gardens in Systems Theory and Modelling

Bahá'í principles of physical and spiritual development represent the basic systems thinking model, which discusses understanding a feedback loop as their systems awareness. Bahá'ís, aware that they are building a religious and administrative centre for themselves according to their principles, which support nature, symmetry, aesthetics, and harmony with the environment, have made sure to consider the feedback loop as one of the important elements of modern systemic principles. They anticipated that their gardens in Haifa would be visited by pilgrims and tourists who have a different relationship to their sacred yet attractive tourist space, which is open to all. With a basic system model, we can demonstrate the awareness of a feedback loop that implies a sustainable solution and the regulation of tourist arrivals.

Figure 1 presents a basic system model, also called a causal loop diagram or CLD. Despite different names of models and practices, the term 'sustainability' appears in the context of connected or equal evaluations that are re-established by post-modern society with its mainly liberal rules (Zabukovec Baruca & Brezovec, 2014). The basic system model is a regulation circle, represented by two arrows showing the interaction between the attractiveness of gardens and tourists. The bottom arrow represents the feedback loop that completes the process. The interpretation of a model is the following: the Bahá'ís are aware that the greater the attractiveness of their gardens, the more tourists they will attract, which is indicated in the model by the + sign, representing the magnifying effect and growth. However, by being aware of the feedback loop, indicated by the – sign in the figure, they have shown that they are aware that the attractiveness of their gardens decreases as the number of tourists increases. This basic demonstration of systems thinking goes beyond linear thinking in considering the feedback loop. Without the awareness of the feedback loop, linear thinking shows only one interest: the goal of continuous growth, sometimes dramatically. Constant rise is a cause of levelling off or falls depending on the strength of the limiting structure, which we name a systems archetype of 'limits to success' (Kim & Anderson, 2011). With their level of consciousness, Bahá'ís have avoided the pitfalls of linear thinking. They believe that the challenges facing humanity today call for spiritual transformation in the hearts and minds of individuals and the systems of structures of society (Fisher, 2017), representing their shift of consciousness from linear to systems. The Bahá'ís say that human history is a spiritually dynamic process (Hatcher, 2017), representing consciousness's evolution.

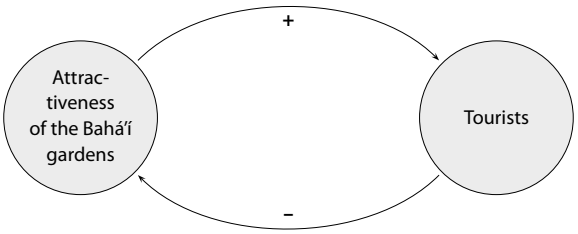

Figure 1 Basic CLD (Causal Loop Diagram) of the Bahá'í Gardens' Attractiveness and Tourists

> Humanity has emerged from its former degrees of limitation and preliminary training. Man must now become imbued with new virtues and powers, new moralities, new capacities. New bounties, bestowals and perfections are awaiting and already descending upon him. The gifts and graces of the period of youth, although

> timely and sufficient during the adolescence of the world of mankind, are now incapable of meeting the requirements of its maturity. The playthings of childhood and infancy no longer satisfy or interest the adult mind. [Bahá, 1979, p. 9]

This stage of maturation, the adulthood of our species, can only come about with a new consciousness of the oneness of humanity (Langness, 2020). With this information and the systems orientation, we could build a larger CLD model of interdependency among stakeholders who play essential roles in the sustainable growth of Bahá'í Gardens' tourism. We selected the following stakeholders.

- Bahá'í WHS in Haifa
- Investments in the Heritage
- Infrastructure
- Bahá'í Pilgrimage Events
- Programmes and Products for Tourists
- Attractivity of the Bahá'í Gardens
- Number of Tourists
- Local Community
- Environment and Water Preservation

Figure 2 shows the causal loop model as a complex WHS tourism system with all its interdependent elements (Jere Jakulin et al., 2020) that influence each other. The 'pluses' represent reinforcing cycles, where elements positively influence each other, and their values increase. The 'minuses' maintain systems stability, or 'harmony' in the language of Bahá'í.

The system presents the interdependency and dynamics among the elements. This whole cannot properly function without the strength of each of the stakeholders. In systems methodology and philosophy, one must always think of feedback loops. The system will decline if it contains too many plus signs, '+,' which denote growth. The minuses, '–,' are essential as they represent a sustainable or balancing factor. The interpretation of picture 2 would be as follows: Bahá'í WHS in Haifa increases and positively (+) influences the infrastructure in the gardens. The infrastructure

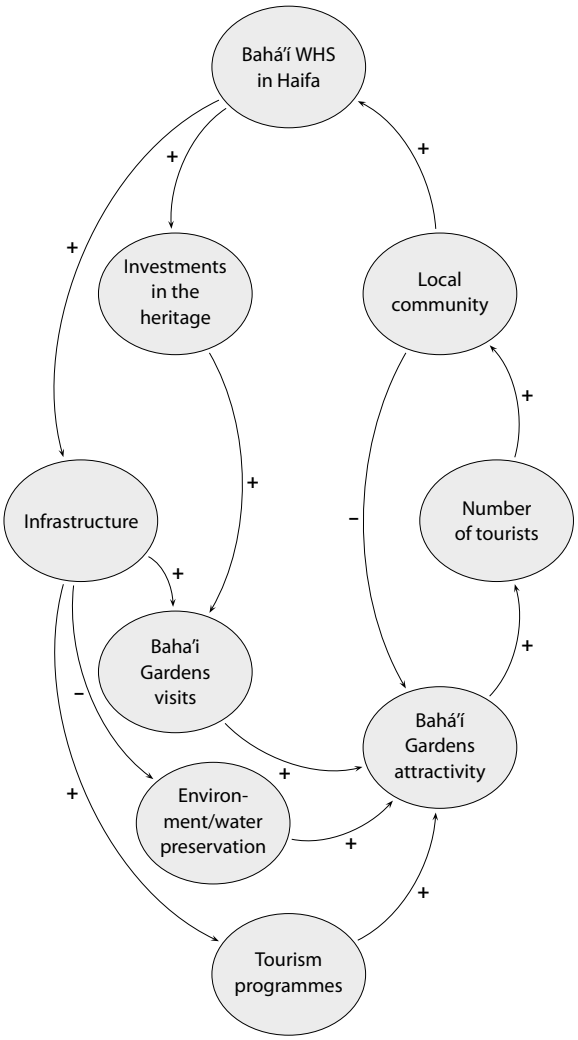

Figure 2 CLD Model Diagram of Dependency among Tourism System Elements

increases and positively (+) influences tourism programmes, which positively (+) influences the attractivity of Bahá'í Gardens. The attractiveness of the gardens increases (+) the number of tourists, and the number of tourists increases positively (+) in the local community. The local community ultimately (+) influences the WHS in Haifa. The description of a reinforcing circle shows upbeat (+) influences among the elements of the system. To maintain sustainability, one must anticipate and seek balancing elements to maintain sustainable (systems) growth. We can see

from the model that infrastructure causes a decrease (–) in environmental preservation, but the preserved environment positively (+) influences the attractivity of the gardens. The gardens positively (+) influence the number of tourists, which causes growth (+) of crowds in the local community, and a crowded local community is a cause for the decrease (–) of the Bahá'í Gardens' attractivity.

Bahá'í practically operates on this systems level. They believe in harmony with nature and all living beings; they take proper care of the terraced gardens to conserve water in an arid climate and practise water-saving measures, energy conservation, and recycling. Bahá'í WHS administration increases (+) investments in the heritage, which influences (+) balanced visits to the gardens, and these positively (+) impact the attractivity of the gardens. Bahá'í Holy Places are associated with the green pilgrimage network. The Green Pilgrimage Network members teach visitors (tourists and pilgrims) about systems or sustainable thinking by 'walking the talk' rules.

Systems Approach in the Practice of Bahá'í Gardens Management

Managing Pilgrims and Tourists

The Bahá'í visitor management manages the flow of tourists with walk-in tours and tours for organized groups. There are many different tours and programmes available. The gardens offer a Lower Terraces tour (for less than 20 people), extensive group tours (for more than 20 people), and self-guided visits from Wednesday to Sunday in the forenoon and afternoon. The visitor management opened two entrances, one for the tourists, and a guided tour through the gardens (groups or individuals) from the entrance to Mount Carmel. The visitors climb down to the middle of the gardens. The pilgrims climb up Mount Carmel. This climbing up includes the Hakramin (134 steps) and Shifra (236 steps) stairs, which lead to the Pilgrim Reception Centre, where pilgrims register. There are 1,625 steps all over the terraces. Entrances are separated so that tourists and pilgrims do not meet. Both motivations are different, but the environment induces serene admiration of the symmetrical, floristic-rich garden terraces. Differentiation between pilgrims and tourists is essential when exploring the socio-spatial dynamics of tourism and pilgrimage landscapes (Gatrell & Collins-Kreiner, 2006). The Bahá'í visitor management created distinct spatial practices to preserve the integrity of pilgrims and tourists and their activities. In 2013, 917,031 tourists and 8,000 Bahá'í pilgrims visited the gardens (Collins Kreiner et al., 2015). In 2019 more than 1.6 million visited (Bahá'í World News Service, 2019). Noteworthy is that all tours are free of charge, representing the essence of this heartful and hospitable religion, which wants to share the beauty of their belief and thinking with society and those who wish to experience the symmetry of nature.

The entrance for the smaller group of tourists is located at the western edge of the Bahá'í Gardens at Hatzionut – up from the bridge. The tour takes approximately one hour and includes 600 steps. This tour is of medium difficulty and is not suitable for people with walking difficulties. The tour ends at the German Colony Plaza on Ben Gurion Avenue. The entrance for groups of more than twenty people is at the Bahá'í Gardens balcony and includes 750 stairs. The tours are unique experiences, offering views of the upper and lower terraces and the Haifa Temple. They include informal and formal gardens with a mix of native and adapted trees, plants, and flowers. As at most other places of this type, visitors are advised to wear modest clothing that covers the shoulders and reaches to the knees without modern rips, to help keep the place clean and beautiful, and to be considerate of the sensitivities of others.

Environment: Recycling, Water Conservation and Saving Measures

The Bahá'í Gardens in Haifa and Akko have been managed in an environmentally conscious way from the beginning, with a particular focus on water conservation. The recycling of green waste into mulch and compost, for example, dates to the 1950s, as does the practice of treating large areas of lawn in early summer and leaving them to lie fallow until the winter rains arrive, when they are re-seeded. During the planning of the construction of the terraced gardens on Mount Carmel in the 1980s, Bahá'ís carried out exten-

sive research and discussions with the Water Commission, the water company Mekorot, and some of Israel's top consultants and academics in the fields of horticulture, irrigation, and water management. The conclusions were fully considered in the detailed design of the garden planting and infrastructure systems so that the project was based on sound ecological principles and incorporated the most advanced technology. The irrigation systems installed in the Bahá'í Gardens are among the most advanced in the world. At the heart of the system is a computer that controls hundreds of valves to direct water through a complex network of polyethylene pipes so that each type of plant gets the amount it needs at the right time according to atmospheric conditions. Evapotranspiration (ET) is the transfer of water in the form of water vapor from the earth's surface and through the leaf slits of plants into the atmosphere. It is the leading indicator of the amount of water the vegetation will need. The irrigation planner uses meteorological data from a detailed weather forecast to predict the evapotranspiration rate (Bahá'í International Community, 2020).

To reduce the strain on drinking water, the Bahá'í Gardens extensively use saline and contaminated water, which is drawn from licensed wells on the property and then treated to meet the Gardens' requirements. Most of the water is delivered directly to the roots of the plants at night by drips and sprinklers. At the same time, the occasional overhead irrigation, which must be carried out during the day to ensure the absorption of fertilizers and other agrochemicals, is planned for early in the morning when evaporation is at its lowest. The computer detects any leaks or other anomalies, and the irrigation team checks the equipment frequently to ensure any problems are detected and corrected immediately. In addition, there is an ongoing review of irrigation programming and water delivery systems, including the study and testing of new technologies, new types of equipment, and new approaches to improve system performance. The central design feature of the terraced gardens on Mount Carmel is the flowing water, which seems to always follow the visitor, pleasing both the eye and the ear. These effects are achieved without wastage, as the fountains and streams flowing along the steps are fed from a single closed system that circulates in each terrace unit. The amount of water added to the evaporation system each day for the whole area is less than the daily consumption of an average person (Bahá'í International Community, 2020). The Baha'i Gardens are members of the Green Pilgrimage network.

Infrastructure and Cooperation with Local Community

The magnificent infrastructure, reflecting the beauty, symmetry, and light of the Bahá'í Faith, has become a magnet for visitors, a source of strength for pilgrims, and a world attraction for tourists. The Golden Dome Shrine is the first thing one sees when entering the Bahá'í Gardens. The Golden Dome Shrine, located in the northern part of Mount Carmel, was built at the beginning of the twentieth century to bury the remains of the founder of the Bahá'í religion, the martyr and prophet of Shiraz, the Báb. The site was shown to 'Abdu'l-Bahá in 1891 by his father Bahá'u'lláh, a Persian nobleman who was persecuted for following the teachings of the Báb and had to flee Persia in 1853. 'Abdu'l-Bahá built a modest mausoleum on the present site in 1909 and buried the Báb's remains. The subsequent systematic, gradual, and strategic development of the surrounding gardens reflected the growth of the Bahá'í community. 'Abdu'l-Bahá's successor, Shoghi Effendi, expanded the Bahá'í faith and formed the world community. The construction of the Golden Dome Shrine was finished in 1953 (https://www.bahai.org/the-bab/shrine). The building of the Universal House of Justice is on the northern slope of Mount Carmel together with the Shrine of the Báb and other administrative buildings. It is the international governing council of the Bahá'í Faith. Bahá'u'lláh ordained its creation. He also conferred authority upon the Universal House of Justice to positively influence humankind's welfare, promote education, peace, and global prosperity, and safeguard human honour and the position of religion. It is charged with applying the Bahá'í teachings to the requirements of an ever-evolving society and is thus empowered to legislate on matters not explicitly covered in the Faith's Sacred Texts. The guidance provided by the Universal House of Justice ensures unity of thought and action in the Bahá'í community as it learns to translate into reality Bahá'u'lláh's vision

for a spiritually and materially prosperous global civilization (see https://universalhouseofjustice.bahai.org/unique-institution).

Local Community and Cooperation

The Bahá'í religion encourages cooperation, helping, learning, and thinking about systems where everything is connected and interdependent. The work of volunteers, many among the Bahá'ís, plays a significant role. They maintain the gardens themselves, keep them tidy and run programmes and tours of the gardens. The many tours and the millions of annual visitors to the gardens help the local tourist board and the city of Haifa, which in 1909 became the most important city for the Bahá'ís and, for decades, a centre for Bahá'í pilgrims. Haifa became one of the most visited tourist attractions in Israel after listing the Bahá'í Shrines and Gardens as a UNESCO World Heritage Site in 2008.

Conclusions

The knowledge that World Heritage Sites are magnets that attract tourists and visitors from all over the world is attractive, but it is also the responsibility of all site managers. The Bahá'ís, through their work, voluntary contributions, love, and trust, have built the terraced gardens of Haifa and the buildings that have become part of UNESCO's cultural heritage. The harmony of scientific and spiritual truth functions as one of the central tenets of the Bahá'í Faith. Science and religion both contribute to a profound synergism. Both reveal themselves progressively. The great Faiths build upon and reinforce each other over time, just as the scientific method advances knowledge with each discovery (Langness, 2021). As wisdom is rarely explained in the language of science (Jere Jakulin, 2019), so is religion.

Nevertheless, religion and science have systems qualities: balance, common goals, dynamics, interdependency, and feedback loops. Consequently, it is necessary to consider the feedback loop that balances an overloaded system. In our field research, we have experienced that the Bahá'í religion's representatives are true systems thinkers. They follows systems thinking principles: the first principle is The Big Picture, which is visible in their tourism and pilgrimage organization for the benefit of the environment and future. Their respect shows the second principle of interdependency, dedication to the feedback, and symmetry of the surrounding. The third principle is visible in their measuring water supplies, numbers of visitors and pilgrims, which influences the fourth principle of short and long-term – they are aware of all the potential impacts of whatever strategy they choose. The fifth system's principle is the Bahá'í awareness that they are part of the environment in which they live. They care for it ecologically, sociologically and economically and preserve it for future generations. They anticipate the feedback loop and ensure that all activities are planned with clear rules and respect for balance of nature and fellow human beings. We have illustrated their systems or sustainable attitude in a qualitative causal loop model, which presents the first step in systems modelling, a basis for a quantitative model. At the same time, we have presented the parameters captured in the model through field observation and photographs.

The future of preserving the world's cultural heritage for the planet's and humanity's benefit lies in understanding the systems approach of those who make decisions about the future development of tourism. Understanding systems thinking and systems dynamics brings sustainability to tourism development in a natural way. The example set by the Bahá'í religion, with its systems practice of managing tourism to maintain a balance in the environment, is one that tourism operators, regardless of the type of tourism, must follow in the present and the future.

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