

Aquatic realms and running water in sustainable tourism

A. A. Berezin

Department of Engineering Physics, McMaster University, Hamilton, Ontario, Canada

Abstract

Much of touristic activity in one way or the other focuses on water and aquatic realms, such as sea beaches, lakes, rivers, etc. Sustainable use of water resources by various types of tourism (beach resorts, cruise lines, ecotourism, etc) often becomes an acute problem at a local (and in some aspects – at a global) level. Humans have a natural attraction to aquatic features such as waterfalls where places like Niagara Falls generate a multi-billion tourist industry. In the present paper we discuss various aspects of people's fascination with water in the contest of sustainable tourism. Our local examples include waterfalls in Hamilton, Ontario, as well as recent (and still on-going) conversion of segments of shores of Lake Ontario in Toronto, Hamilton and adjacent communities from industrial to recreational use.

Keywords: sustainable tourism, water in tourism, water in architecture, waterfronts, waterfalls, waterways, water psychology, water management, environmental integration.

1 Introduction

Water as a foundation of biological life is indisputably the most important chemical substance for human existence. Proximity to water in a variety of its forms plays a significant role in most forms of touristic industry. Aquatic realms, such as sea beaches, lakes, rivers, and channels have generated multi-billion touristic infrastructures across the world. The latter include world-wide networks of beach resorts, cruise lines, water sports, newly reclaimed waterfronts, and ecotourism. Visual attraction of running water, from river cascades and majestic waterfalls to numerous artificial fountains (which are often integrated with the



best pieces of architecture), is generally a well recognized fact. Even ski tourism may be included to the same fold since snow is obviously a form of water. The present paper discusses some psychological, cultural, historical, environmental and philosophical aspects of this attraction of water in a context of sustainable tourism. As examples, the paper reviews touristic impact of waterfalls in Hamilton, Ontario (the unofficial “waterfall capital of the world”), as well as recent (and still on-going) conversion of segments of shores of Lake Ontario in Toronto, Hamilton and adjacent communities from industrial to recreational use.

2 Aquatic aspects of tourism

This section outlines various sides of relationship between water and tourism. First, a few words about the definitions.

2.1 Tourism: definitions and diversity of its form

The World Tourism Organization (UNWTO) defines tourists as people “traveling to and staying in places outside their usual environment for not more than one consecutive year for leisure, business and other purposes”. Yet, like with most clear-cut definitions, the reality is much broader and more diverse. With its multiple forms [1] the very concept of tourism cannot be fully and uniquely defined with a mathematical precision. Similar diversity exists for what is traditionally referred to as an aquatic tourism [2]. Many tourist activities used mixed forms, for example tourists from cruise ships can visit city art galleries and other land attractions. Some activities can be labeled as tourism or recreational activities. For example, such activity as golf (which is one of the most water-intensive uses) in some jurisdictions falls into a category of tourism (say, golf resorts on tropic islands) while city-based golf-courses with fixed membership look more like recreational facilities. However, for the purpose of this article with its focus on sustainable water management, this distinction is not critical. In particular, maintenance of golf courses (especially, in dry areas) usually takes disproportional amount of water from local sources and this often produce ecological and social tensions in the communities.

2.2 Sustainability in theory and practice

As a general idea, “sustainability” has many facets. Sustainable Economy, Sustainable Society, Sustainable Tourism and Sustainable World as a whole - all these concepts are popular and philosophically appealing. Yet, in reality, these are all “asymptotic concepts” whose interpretation and implementation is often colored by particular local, economical and demographic specificities. As a theoretical construct, complete sustainability is in ontological conflict with the principle of evolution and progress. Everything is evolving and is subjected to change. In a constantly evolving world with ever growing (now, almost exponentially) population, the actual meaning of what is called “sustainability” is a dynamical, rather than a static parameter. All fixes are only temporary and partial. In this regard sustainable tourism and sustainable water management are



multifaceted concepts which in each case are formed by a combination of general principles and specifics of a particular locality.

2.2.1 Sustainable tourism

According to the definition of the UNWTO, “Sustainable tourism is envisaged as leading to management of all resources in such a way that economic, social and aesthetic needs can be fulfilled while maintaining cultural integrity, essential ecological processes, biological diversity and life support systems.” While this definition can be taken as a general guideline, the practical adherence to it often subjected to of tensions and conflicts with a variety of vested interests coming from multiplicity of ends (regional planning, commercial and development interests, pressure from various public interest groups, etc). Furthermore, numerous policy documents, government acts and regulations, local by-laws, etc are often ambiguous, prone to challenges, and often generate substantial amount of litigation activities, especially in such touchy areas as sustainable development and environmental protection. For example, a recent document [3] points to numerous flaws and inconsistencies of existing policies related to sustainability in Canada.

2.3 Planetary water resources

Water is an immense planetary resource. Out of some 500 millions square kilometers of the Earth’s surface, water covers about 3/4. The total volume of the hydrosphere is about 1.3 billion cubic kilometers. In order to vividly appreciate that one can imagine that some “extraterrestrials” will be stealing Earth’s water at a rate of one cubic kilometer per second. It will take them 40 years to finish the job. It will take 20 million years (!) for all Earth’s water to go through Niagara Falls (average flow rate of NF is about 2000 cubic meters per second).

In spite of such a seemingly enormous amount of water in the Earth’s hydrosphere, the contamination of oceans and beaches by various forms of human activity becomes a serious global issue. Tourist activities, such as cruise ships and numerous beach resorts, contribute significantly to the problem. For smaller aquatorias, especially closed lakes (such as Dead Sea or Great Salt Lake) similar problems exist.

2.3.1 Aquatic resources in tourism

According to the estimates from the UNWTO, international tourism will reach one billion this year (2012). This, apparently, does not include domestic tourism which often borders with recreational activities. Overall, much of tourism, in one way or the other, is related to aquatic realms. Essentially, all aquatic entities, rivers, creeks, lakes, lakeshores, waterfronts, waterfalls, fountains, may have a touristic value. The degree of their exploitation by the touristic business varies in enormous degrees, depending on many geographical, national, economic and climatic conditions. Some small tropical, Mediterranean, or Caribbean islands are heavily used, while there are no known beach resorts along the shores of the Polar Ocean or Antarctica continent (this is not to say that the latter areas have



no pollution problem - ocean contaminations spreads even to the most remote areas of the globe).

2.3.2 Canadian angle

Canada holds about one quarter of all free fresh water in the world. Hence, the maintenance of its water resources incurs on it a substantial international responsibility. While tourism in Canada is largely confined to some rather localized regions and touristic routes, these are the areas where the quality of water is of prime importance for the fast growing population and cities.

2.4 Human fascination with water

As the most important chemical substance for human life, water often plays a central role in many forms of art, folklore, mythology and philosophical reflections, religious rituals and recreational activities. There are several key points in this regard which, we believe, warrant specific comments.

2.4.1 Water as a “strange attractor”

In non-linear physics (physics of chaos) the concept of a “strange attractor” is used to signify a repetitive return of a dynamic trajectory of the system to the same locality in the phase space. In human affairs, constant return of individuals to same localities, interests or behavioral patterns (which can be metaphorically called “magnetism”) also can be described in the same fashion. In this way, our constant strives and returns to water in all its forms and contents are among prime anchors of our lives.

2.4.2 Quasi-psychology of water

It is not an occasion that in many mythological systems water is assigned with properties of some quasi-alive substance (e.g., “dead” and “life” water in Russian folklore). At the foundation of Ancient Greek philosophy, Thales of Miletus (ca 624-547 BC) considered water as the foundational and primordial substance of the universe. In view of the fact that hydrogen is the first element of the Periodical Table (and hence all other elements, in a sense, are build from hydrogen), such a view is, actually, not far from the modern science. Taking into account that water makes up ca 60 per-cent of human body weight, our fascination with water is well grounded physiologically, culturally, esthetically and philosophically.

2.4.2.1 Informational and healing aspects of water is an interesting and controversial area. Several non-mainstream medical practices (most notably, homeopathy) are based on the use of diluted water solutions where the purported healing action is claimed on the basis of water ability to retain some form of memory [4]. Some researchers attempt to look for possible physical foundations of these effects, while others dismiss such claims as akin to the use of “holy water” and alike. Yet, in spite of all the skepticism of these claimed effects, this practice is broadly used across the world with some known centers of “healing tourism”. This alleged “memory effect” in water (which sometime is attributed



to its complicated structure of hydrogen bonds and isotopic diversity) and its capacity to act as a depository of informational patterns (akin to “Babylonian Library” by Jorge Luis Borges) may be one of the reasons that so many people, consciously or sub-consciously, are attracted to water in its many manifestations.

2.4.2.2 Allure of running water as a source of inspiration can be amply attested from literature, poetic and artistic sources. Much of the touristic attraction to waterfall and water cascades comes, implicitly and explicitly, from this - almost spiritual - impact on human creativity and imagination. The range of water expenditure in objects with running water runs over some 10 orders of magnitude, from majestic waterfalls (Niagara Falls) to small Baroque fountains with a few drops per second (e.g., miniature cascade fountains in the Pavillion Hall at the Hermitage Museum in Saint-Petersburg, Russia). Romantic attraction to major waterfalls and water cascades comes not only from their majestic views and light effects (e.g., rainbows at NF), but also from refreshing air humidity around them, as well as specific sound effects (noise spectrum of running water with abundance of low frequencies). That’s what bring non-stop touristic crowds to them all around the year. As M.G.Bachmann puts it, “many attributes of water conveyed literally, metaphorically, symbolically, or allegorically in mythology, and religion. This happens because of the rich attributes and power of the water, as one of the four elements in our planet” [5]. In this anthropomorphic attitude human attraction to running water can at times invoke a kind of quasi-religious adoration (as if the water cascades or waterfalls call for some “worship” by the viewer). In fact, many popular waterfalls do indeed produce these kinds of feelings which often leave everlasting memories in people.

2.4.2.3 Water in entertainment is another source of tourist activity with numerous water parks, water slides, recreational boat trips and private boat marinas. Example is a Marineland water park with marine animals at Niagara Falls, Ontario, which is among major touristic attractions in the area.

2.4.2.4 Water as gravitational equalizer is another “hidden” reason for human fascination with running water and waterfalls in particular. While the obvious dynamics of running water and water cascades is governed by classical principle of energy minimization, the more subtle effects like postulated links between the gravity and human consciousness (as proposed by Roger Penrose and others) may have taken place in this allure of running water.

2.5 Water in architectural integration

Apart from some of its minor forms (e.g., medical tourism), tourism has two major arms: natural and architectural/cultural. The first targets natural wonders such as Waterfalls, Rain Forests, Safaris, etc, the second includes visits to historical cities, museums, battle-sites, etc. In practice, many tourist packages blend both these components. In this regard, integration of aquatic features, both natural and artificial, into sustainable environments comes up as multi-sided



issue with a variety of technical (e.g., stability of buildings and other constructs), economical, commercial and (at times) legal aspects.

2.5.1 Water cities: Venice, Amsterdam, Saint Petersburg, Copenhagen, etc.

The above mentioned cities (and a few others) are among world touristic hubs which, to a large extent, are popular due to centuries-old integration of their water resources with the best pieces of architecture. Large volumes of touristic traffic often put significant pressures on the management of water resources in these cities, often with conflicting and questionable results. Dilapidation and degradation of historical architectural buildings, fortresses and embankments, which often (but not always) are temporary fixed by restorative efforts, is a common scenario in many of these historic cities.

3 Sustainability and environmental concerns of mass aquatic tourism

As it is well known, the contamination of the World Ocean and smaller water reservoirs is one of the key global environmental problems. While some touristic activities contribute their share to water pollution, for all practical purposes it is often difficult to separate rigorously what pollution comes from common human activity and what from tourism.

3.1 Environmental water management in sustainable tourism

For local aquatic features like picturesque waterfalls, channels, lakes and ponds, the water management is usually a matter under the jurisdiction of local authorities. Often the combination of preventive and treatment measures is reasonably sufficient to address the problem. At the same time, global water-based tourism, such as cruise lines, calls for the environmental protection measures at the international level.

3.1.1 Cruise ships

Cruise ships (ca. 300 world-wide) constitute only a small fraction of the world's entire merchant fleet (ca. 80,000 vessels), yet because of a high number of passengers and crew on cruise ships (up to 8,000 people), their per-ship contribution to the waste is disproportionally larger. The cruise ships also known for high diversity of their discharges which include sewage, gray-water, hazardous wastes and toxic substances, oily water and solid waste. The environmental impact is exacerbated by the fact that cruise lines normally use only a selected routes and areas such as Mediterranean, Caribbean, Alaskan, etc. This affects both marine and costal environments. Professor Ross A. Klein of Memorial University, Newfoundland, Canada who often writes under the pseudonym "cruise junkie" in his numerous books and reports (e.g., [6]) has documented multifaceted environmental impact coming from cruise industry as well as efforts of numerous environmental groups to address the issues at a political and legal level. Apart from the above mentioned discharges, for global



tourism (both aquatic and non-aquatic), the disposal of such items as billions of plastic bottles, whose natural recycle decay lifetimes may come to several centuries, present another long-term environmental risk of its own.

3.1.2 Internal waterways

Such internal waterways as Trent-Severn Waterway system in Ontario which handles only small recreational boats and almost no commercial vessels (if at all) often experience heavy boat traffic at pick seasons. That puts additional pressure on water contamination in connecting lakes as well as creates problem for fishery and lake sedimentation. A recent government Federal-Provincial Memorandum of Understanding ranks Trent-Severn Waterway and its watershed a National Historic Site of Canada, a key tourist attraction, a precious natural and cultural resource and emphasizes its long term ecological, social and economic sustainability for today's citizens and future generations [7].

3.1.3 Aquatic sanctuaries for wildlife

Wild-type aquatic sanctuaries for wildlife are now quite often integrated within the outskirts (or sometime even the core) of major city centers. There are several of them in GTA (Greater Toronto Area). It may provide the habitat for birds, beavers, butterflies, and other life-forms, as well as for scores of wild plants. The need for constant maintenance and protection of such sanctuaries is obvious in view of constant pressures from the visitors, city developers and commercial activities [8].

3.1.4 Ecotourism

Within the general context of ecological management [8], ecological tourism (ecotourism) is "by definition" supposed to be environmentally-friendly, in reality, it often displays some problems. It is as a rule a relatively massive (often, large groups of tourists) and at the same time usually focuses on relatively small and localized areals with a delicate ecological balance. As it is demonstrated in the Catastrophe Theory and Theory of Chaos [9], even small perturbations are often capable to produce strong and at times, irreversible (singular) effects. Dynamic self-stabilization such as *self-organized criticality* [9] as well as more all-encompassing models (like Gaia model of James Lovelock [10, 11]) can be used for critical analysis of problems in ecological tourism.

3.2 Sustainability and water management

Water management in tourist-intensive areas is a multifaceted social and economical issue. Here, in continuation of thoughts of Section 2, we mention a few more general points regarding the sustainable maintenance of water resources at a global and local level [12]. However, sustainable development and sustainability, as good as these terms may sound, are not without internal controversies. As Richard Register puts it, *sustainable development alone does not lead to sustainability. It may, in fact, by relieving some of the pressure, thus support the longevity of the unsustainable path*, [8, p. 133]. As far as water



resources are concerned, the prime aspects related to sustainable aquatic tourism are water supply in dry and water-deprived localities and water pollution.

3.2.1 Water shortages in social context

Despite of a huge over-all amount of water on Earth (Section 2.3), water, like most natural resources, is distributed highly non-uniformly. For many dry areas the competition for water from various uses (residential, agricultural, industrial, etc) puts water-intensive tourist activities (e.g., golf courses) in low-priority position. Tourism and most recreations are, after all, forms of entertainment and pleasure, not prime human necessities. Therefore, maintaining beautiful green golf courses among low-cost residential dwellings may not produce a universal public sympathy and at time may even lead to a mild resent. Yet, the fact that these activities as a rule generate significant revenues usually somewhat settles the issue.

3.2.2 Water pollution and water contamination

While water pollution is not entirely a tourist issue, mass tourism contributes perhaps somewhat disproportional share to it. People out of their homes are generally less careful about trash disposal or recycling. Dumping of such items as metal cans or plastic bottles at beaches or near popular cruise landings and nautical tourism routes [13] is a common problem. Overall, there are some 25 billion plastic bottles of water discarded every year [14] of which a large fraction ends up in the environment and tourist sites. Numerous studies show that as a rule bottled water does not have claimed superior qualities over the properly processed tap water.

3.2.3 Toxicity and health aspects of water

While the aspects of water quality and health effects is an enormously diverse area of research activity, they have a special reflection in the context of mass tourism. Complicated atomic structure of liquid water [4, 15] brings informational and health-related issues into the view. Water toxicity and the role of contaminants and microelements diluted in water is not a uniformly “bad” or “good” issue.

3.2.3.1 Balneology (hydrotherapy) is another form of water-based activity in which touristic and medical aspects successfully mix. A significant world-wide tourism exists around a number of popular resorts with mineral springs, such as Karlovy Vary (Carlsbad) in Czech Republic, Kislovodsk and Yessentuki in Russia, or Borjomi in Caucasus mountains (Georgia) and many others. In some localities sustainable and controlled use of mineral waters calls for constant monitoring to prevent the depletion and contamination of the springs. This requires a proper balancing between (often excessive) commercial interests (e.g. mineral water bottles plants) and preservation of natural capacity of the springs.



4 Ontario prospects

While at global level tourism and tourist-related economy amount to about 5.5 to 6 per-cent of the GDP, in Ontario is about 3.6 percent, although the trend is growing. Few comments, related specifically to Ontario realm are below.

4.1 Recreational and touristic development of Ontario waterfronts

Waterfronts often have particular touristic significance and hence may bear disproportional share of environmental impact which often calls for a need of enhanced sustainability and ecological management [13, 16]. As a local example of such activities it can be mentioned that on April 15, 2010, the Ontario Ministry of Natural Resources, the Ministry of the Environment, and the Great Lakes and St. Lawrence Cities Initiative hosted a one day workshop in Toronto, Ontario on working together to improve Ontario's beaches and coasts. More than 90 individuals from municipal and regional governments, Conservation Authorities, non-government agencies, and a variety of Provincial, Federal and bi-national government agencies participated in the workshop. This workshop was designed to bring together provincial, federal municipal groups and experts with the goal to increase provincial and municipal collaboration to better protect, restore, enjoy and promote our coasts and beaches, and to begin discussing the components of a potential beach and coastal strategy in Ontario. As the workshop document puts it, *living in Ontario, we are fortunate to have thousands of kilometres of coasts (including islands) and exceptional beaches. This natural and cultural heritage requires our combined focus and increased efforts to ensure that our coasts and beaches continue to provide healthy and diverse experiences and opportunities to our connected, community and coastal resources.* As emphasized, sustainable tourism needs to diversify the local economy, optimize economic growth, improve local and regional linkages, and fairly distribute economic benefits to community residents and the local tourism industry.

4.1.1 Golden Horseshoe and Niagara region

Golden Horseshoe urban agglomeration which includes GTA (Greater Toronto Area), Hamilton, Niagara peninsula and surrounding communities. It has over 8 million people, one-fourth of the population of Canada. As a site of one of the world top touristic attractions - Niagara Falls - it continues growing fast and the issues of sustainable tourism are of growing concern [17]. In recent decades the industrial shores of GTA and Hamilton are gradually developing into touristic and recreational use. With a slowing down of heavy industries and transition to high-tech companies the above development provides some additional economic incentives for the area.

4.1.2 Hamilton waterfalls

Western side of Lake Ontario often nicknamed "Golden Horseshoe", includes a city of Hamilton located at the apex of the Lake as well as surrounding regions stretched along the picturesque Niagara Escarpment. Industrial city of Hamilton



in recent years is gaining notoriety as a touristic attraction. There are a few reasons for that. Firstly, it is the fact that it is a two-level city with Niagara Escarpment dividing city on two, almost equal parts. The Downtown part (in Hamilton the “downtown” is literally “down”) is at the level of Lake Ontario (77 meters above the sea level), while the Upper (Mountain) part is more-or-less leveled with Lake Erie (about 100 m higher). Secondly, Hamilton, with a few surrounding villages, features several dozen (by some counts over 100) bigger and smaller waterfalls which purports some touristic brochures to call Hamilton a Waterfall Capital of the World. Some of the Hamilton waterfalls have touristic sustainability problems (contamination, dilapidation), a few waterfalls are on private property which may require special arrangements for access, some are integrated into the popular restaurant facilities, etc.

4.1.3 Evolution of Hamilton/Toronto waterfronts

Lake shore trail in Toronto now runs for over 10 kilometers of an interrupted path beyond which there are still few interruptions due to the existing lakefront private properties. Similar development takes place along the shores of Hamilton (Burlington) Bay where the trail goes for 4 kilometers with a few touristic attractions on the way (Marine Life Museum, Battleship Haida, gun batteries from 1812 war). The water quality in Hamilton Bay remains a serious concern, however, in recent years the situation is gradually improving.

5 Conclusion

There are numerous tools of reflective analysis which are commonly used in various areas of human activity. The choice is ample [18] and the selection is often the result of a personal tastes and preferences. Potential tourists usually have some (often vague) ideas of what they want to see and at the same time they are facing (often aggressive) advertisement and commercial pressures from the touristic agencies selling them their packages. This is what is commonly known as a “Paradox of Choice” [18] (too many competing choices) and the practical resolution of it is often based on various models like game theory [19] or intuitive Fuzzy-logic type of approach [20] in which a sheer randomness often turns out to be a determining factor.

This paper is written in the interdisciplinary framework which by necessity includes a broad inter-crossing of inputs and ideas. Some of these ideas were previously used for the discussion of other topics of environment, management and decision making [9, 20, 21]. Inevitably, such a discourse bears a certain stamp of personal interests and experience. In no way the author claims completeness or exhaustiveness. Yet, the author believes that some of these suggestions may be picked up and used for further elaborations in the context of theoretical analysis and modeling of the issues related to sustainable tourism and its management.



References

- [1] Cook, C., DeCaro, F. and DeCaro, N., "Tourism modelling for the space coast", In *Sustainable Tourism IV*, Editors: Brebbia, C.A., Pineda, F.D., WIT Transactions on Ecology and the Environment, vol. 139, pp. 133-143, 2010.
- [2] Lehmann, L., "Valuing water in dry land tourism regions", In *Sustainable Tourism III*, Editors: Brebbia, C.A., Pineda, F.D., WIT Transactions on Ecology and the Environment, vol. 115, pp. 207-220, WIT Press, Southampton, Boston, 2008.
- [3] Response to Planning for Sustainable Future: A Federal Sustainable Development Strategy for Canada, Submission by the Canadian Environmental Law Association, July 12, 2010.
- [4] Schiff, M., *The Memory of Water*, Thorsons (Harper Collins Publishers), London, 1995.
- [5] Bachmann, M.G., "Water as a natural and an artistic resource", In *Eco-Architecture II*, editors: Broadbent, G., Brebbia, C.A., WIT Transactions on Ecology and the Environment, vol. 113, WIT Press, Southampton, Boston, pp. 85-94, 2008.
- [6] Klein, R.A., "Protecting Paradise: Minimizing the Downside of Cruise Tourism," *Proceedings of the 5th International Coastal and Marine Tourism Congress: Balancing Marine Tourism, Development and Sustainability* (ed. M. Luck et al.), Auckland: New Zealand Tourism Research Institute, pp. 242-257, 2007.
- [7] Trent-Severn Waterway National Historic Site of Canada - Government of Canada and Province of Ontario work together for the Future of the Trent-Severn Waterway, Memorandum of Understanding, July 14, 2011.
- [8] Register, R., *Ecocities: Rebuilding Cities in Balance with Nature*, Revised Edition, New Society Publishers, Gabriola Island, BC, Canada, 2006.
- [9] Berezin, A.A. and Gridin, V.V., "Electromagnetic and informational pollution as a co-challenge to air pollution", In *Air Pollution XVI*, Editors: Brebbia, C.A., Longhurst, J.W.S., WIT Transactions on Ecology and Environment, vol. 116, pp. 509 - 518, WIT Press, Southampton, Boston, 2008.
- [10] Lovelock, J., *The Ages of Gaia*, Oxford University Press, 1988.
- [11] Abraham, R.H., *Chaos, Gaia, Eros: a chaos pioneer uncovers the three great streams of history*, Harper San Francisco, 1994.
- [12] Prud'Homme, A., *The Ripple Effect: The Fate of Freshwater in the Twenty-First Century*, Scribner (Simon and Schuster), NY, L, Toronto, Sydney, 2011.
- [13] Favro, S. and Grzetic, Z., "Nautical tourism - the advantages and effects of development", In *Sustainable Tourism III*, editors: Brebbia, C.A., Pineda, F.D., WIT Transactions on Ecology and the Environment, vol. 115, WIT Press, Southampton, Boston, pp. 35-44, 2008.
- [14] Rogers, P., *Cities for a small planet*, Farber and Farber Limited, London, 1997.



- [15] Marchettini, N., Niccolucci, V. and Tiezzi, E., "The supramolecular structure of water", In *Design and Nature II*, Editors: Brebbia, C.A., Sucharov, L. and Pascola, P., WIT Transactions on Ecology and the Environment, vol. 57, pp. 355-359, WIT Press, Ashurst Lodge, Southampton, 2002.
- [16] Kovacic, M., Grzetic, Z. and Boskovic, D., "Nautical tourism in fostering the sustainable development: a case study of Croatia's coast and island", *Tourismos: An International Multidisciplinary Journal of Tourism*, Vol. 6 (1), pp. 221-232 (2011).
- [17] Jayawardena, C., Patterson, D.J., Choi, C. and Brain, R., "Sustainable tourism development in Niagara: Discussions, theories, projects and insights", *International Journal of Contemporary Hospitality Management*, Vol. 20 (3), pp. 258-277 (2008).
- [18] Schwartz, B., *The Paradox of Choice: Why More is Less*, Harper Collins Publishers Inc., NY, 2005.
- [19] Mosetti, R., "Game theory approach on sustainable tourism", In *Sustainable Tourism II*, Editors: Brebbia, C.A., Pineda, F.D., WIT Transactions on Ecology and the Environment, vol. 97, pp. 337-340, WIT Press, Southampton, Boston, 2006.
- [20] Berezin, A.A. and Gridin, V.V., "Complexity theory in management of heritage architecture preservation", In *STREMAH 2009 (Structural Studies and Maintenance of Heritage Architecture XI)*, Editor: Brebbia, C.A., WIT Transactions on The Built Environment, vol. 109, pp. 255 - 266, WIT Press, Southampton, Boston, 2009.
- [21] Berezin, A.A., "Archetypes of art and concepts of science as pathways from natural to engineering design", In *Design and Nature V*, WIT Transactions on Ecology and the Environment, vol. 138, Editors: Capri, A., Brebbia, C.A., pp. 571-582, WIT Press, Southampton, Boston, 2010.

