

## **"VOLCANIC LANDSCAPES: a field of contradiction"**

Tratsela Maria, Dr. Architect, Assistant Professor, Department of Architectural Engineering AUTH

Vavili Fani, Dr. Architect, Professor, Department of Architectural Engineering AUTH

Gkounta Sonia - Anna, student of Architecture DUTH

*Keywords: Volcanic landscape, contradiction, protection, national parks.*

### **INTRODUCTION**

The volcanic phenomenon is probably the most impressive one among all natural phenomena on planet Earth. The volcanic activities, which accompanied the four and a half billion years history of our planet, have played a major role on its creation and evolution through the centuries. The impact of volcanic action has dramatically altered the overall natural and neighboring man-made environment, either in a close distance from the volcanoes or hundreds of miles away. The result of this impact is easily observed upon their landscape.

It must be clarified that within this paper, the notion of landscape is used to describe something much more complex than the image of what someone may see. It is referring to a dynamic, mutable and interactive "ecosystem" of natural and sometimes man-made elements, which is in continuous transformation over time, each one with its own rhythm of change and with different temporalities (Tratsela, 2011). So, apart from a spectacle, it constitutes a living image of the ecological and human history and culture, while it is a potential field for human action, recreation and amusement, as well as a medium of production and consumption. These attributes seem to compose the hidden power of the landscape, which in the case of volcanic landscapes, is to be found in the most dramatic way.

### **VOLCANIC LANDSCAPE: PERCEPTUAL FEATURES AND BENEFITS**

The first impression of a typical active volcanic site may be, indeed, rather unfriendly. The main reason is that volcanoes are connected with some of the most tragic events in human history, and therefore the word 'volcano' itself is usually nothing more than a reminiscent of disaster, loss and terror. This impression is intensified by the view of unusual and contradictory perceptual elements found upon its landscape: the variety of the landform - created by

smooth, moving lava valleys and terraces or undulating grounds, next to large and clearly out-lined geometric forms of mountains and hills (*Fig. 1*); the wilderness and roughness of textures, which sometimes interchange with smooth surfaces; the rare and vivid natural color palette with sharp contrasts (*Fig. 2*); the distant, panoramic views, coupled by the feeling of exposure, either to the wide-open horizon or to the often uncomfortable climatic conditions of high temperatures and strong winds, and of surprise of the unexpected; the unpleasant but impressive misty atmosphere created occasionally by gas emissions (USGS\_Hawaiian Volcano Observatory, *Last modification: 27 August 2014 (pnf)*). All conduce to the formation of a unique, Marsian-like landscape experience. If combined with the feeling of danger, that the remembrance of the catastrophic power upon man and his civilization evokes, the mystery for the unknown and the unpredictable, one might stand in awe before it.

On the contrary, humans are rarely familiar with the positive impacts of the volcanoes' existence, and with the benefits they already enjoy, or the multiple potential benefits they may gain if approached fearlessly and with prudence.

### **Environmental, economic, scientific benefits and social well-being**

To begin with, the world's highest temperature—and perhaps most abundant—geothermal resources are associated with volcanic regions (Wohletz *et al*s, 1992). Thus, volcanic landscapes constitute important fields of geothermal energy - as natural steam and hot water, coming from the Earth's interior – which is an important and promising alternative energy resource that has shown continual growth throughout this century. It has been exploited for decades to generate electricity for space heating of either indoor spaces – e.g. residences -, or open-ground heating, such as in bathing and swimming areas, greenhouses, aquaculture pond and raceway fields, agricultural drying, snow melting and cooling. It is also used for electricity production and industrial processes (Lund *et al*s, 2005, Barbier, 2002).

The environmental benefits of geothermal energy use are most obvious by the estimated annual savings in fuel oil, which, according to the 2005 World review, corresponds to 170 million barrels (25.4 million tons), and 24 million tons in carbon emissions to the atmosphere (Lund *et al*s, 2005), while the economic benefit comes out of the generally competitive costs of geothermal kWh, compared to conventional sources of energy (Barbier, 2002).

In addition to geothermal energy, there is a variety of products extracted directly out of the volcanic landscapes, which find various applications in building construction industry, landscaping and decoration. These are high quality stone material, such as volcanic and lava

stone, basalt and granite slates, cobbles and pebbles, and raw material for the production of carbon fiber felt and fabrics for heat insulation, as well as fertile soil.

In manufacture, there is a large production of small everyday devices and accessories, such as machinery, furniture, pottery, jewelry, beauty care products and cosmetics with therapeutic properties as well as a few edible nuts and spices (*Fig. 3*).

Apart from the environmental and economic benefits, volcanic landscapes also contribute to social well-being. The therapeutic properties of thermal water coming out from natural springs, has extensively been exploited worldwide for many centuries until today. Bathing in thermal waters, which are rich in minerals, like sulphur, silica, iron or manganese, help people suffering from several diseases, like skin diseases, and other ailments mainly of the elderly (Iceland's Energy News, <http://www.newsweek.com/icelands-energy-lessons-85937>, 14 April 2008, *link accessed 9 April 2008*). They are very often developed as spas or bottled for drinking. In natural lagoons or artificial ponds someone may also bathe in natural geothermal muds for healing purposes, beauty care, relaxation and recreation (*Fig. 4*).

Finally the unique aesthetics of the landscape is often an inspiration for film making (e.g. "2001 Space Odyssey", Kubrick, 1968) or other creative and artistic activities.

These unique advantages of volcano sites often establish them as popular tourist destinations, either for short day visits or longer stays all year round, in organized resorts for therapeutic, recreational and educational purposes. In addition, experts such as volcanologists, geologists, geochemists, ecologists, botanists and others, with special scientific interest visit the regions regularly for observation and experimentation, either on the volcanic phenomenon or for the study of the rare ecosystems of the volcanic landscape.

## **INTERNATIONAL EXAMPLES OF VOLCANIC PARKS**

Touristic development in volcanic sites seems to be an important economic resource for its wider region. There are plenty of examples of Volcano Parks worldwide, with high visiting rates all over the year. National or regional organizations invest on the unique volcanic landscape, its products and bi-products, while contribute to the protection of the volcanic environment and social well-being by creating protected natural environments open to the public.

Among these we have chosen to present three examples, indicative of the multiple dynamic of the volcanic landscape.

### **Blue Lagoon Volcanic Park, Iceland**

A typical example is the Blue Lagoon Volcanic Park in Iceland. For most of us, Iceland is a distant, cold place with fairly poor touristic attractions. But the exceptional natural beauty of the Icelandic landscape, and the unique thermal water baths, mainly due to the presence of volcanoes, places the country among the most popular tourist destinations, highly appreciated for its thermal baths, natural or man-made spa installations and mud lagoons (<http://www.bluelagoon.com/blue-lagoon-spa>) (Fig. 5). So is the Mývatn Nature Baths in the north-east of Iceland, where, apart from the baths and spas, the well-defined tracks for safe walks, horse riding or bicycle rides give the chance to visitors to explore the unique lava fields, natural clay springs or the rich flora and fauna of the area.

### **Kemenes Vulkan Park, Hungary**

Kemenes Park in Hungary is an example of an inactive volcanic park which has recently opened to the public. It is a well-organized park with emphasis on the education of visitors offered by guided tours in the specially designed and fully equipped visitors' center with special rooms for the information and familiarization of visitors of all ages, with the volcanic physical structure and activity. Amongst other, the visitors may find earthquake simulators and high-tech computer animations of special volcanic phenomena such as lava flows, explosive eruptions, hot springs and spas. The outdoor facilities include hiking across the famous Sag Hill, the inactive basalt volcano of the area with a large crater, where someone may learn more about geology, the rich flora and fauna, as well as enjoy long or short walks, picnics or play. (<http://www.itshungarian.com/hungarian-secrets/made-in-hungary/the-kemenes-volcanopark-visitor-center-celldomok-hungary/>) (Fig. 6).

### **National Volcanic Park, Hawaii**

Hawai'i Volcanoes National Park displays the results of at least 70 million years of volcanism, migration, and evolution in the Hawaiian Island. Created to preserve the natural setting of Kīlauea and Mauna Loa, the park is also a refuge for the island's native plants and animals and a link to its human past. Park managers and scientists work to protect the resources and promote understanding and appreciation of the visitors. So, except the recreational and educational facilities offered in the park, the advanced scientific research at the Hawaiian Volcano Observatory makes Kīlauea one of the best understood volcanoes in the world, shedding light on the birth of the Hawaiian Islands and the beginnings of our planet (<http://hvo.wr.usgs.gov/activity/kilaueastatus.php>).

## **CONCLUSIONS**

Volcanism is one of the most powerful and contradictory geological phenomena. It poses a threat to mankind, as in the past, it has very often been associated with a large number of casualties.

But the variety of its landscape, from the wild desert-like open fields to the soft hilly vast lands, coupled with its rich and rare ecosystems compose a natural environment of exquisite beauty, and a unique spectacle to experience. In addition, millions live on the natural wealth of the volcanic landscapes, which expands from valuable natural resources supplies, to human health and well-being provision. Together with their surrounding landscape, volcanoes compose a living testimony of Earth's origin, as well as of the development of human civilization, and thus they should be considered as ecological, cultural and historic monuments. As such they should be protected and enhanced in order to offer to the public the outstanding experience of their visit and the chance to be informed of their contribution to human life and civilization.

Their establishment as National Parks or Eco-Parks, is in itself a method of conserving this natural wealth for future generations. If properly designed and managed, the protection of the environment is promoted, together with the economic growth and social wellbeing, according to the principles of sustainability.

## References

Barbier, E., 2002, Geothermal energy technology and current status: an overview, *Renewable and Sustainable Energy Reviews*, Elsevier, Volume 6, Issues 1–2, Pages 3–65.

Lund, J. W., Freeston, D. H., Boyd T. L., 2005, Direct application of geothermal energy: 2005 Worldwide review, *Geothermics*, Elsevier, Volume 34, Issue 6, December, Pages 691–727.

Tratsela, M., 2011. *Landscape Architecture in Thessaloniki: The role of temporality in landscape design*. (PhD Thesis). School of Architecture, Aristotle University of Thessaloniki, Thessaloniki. (in greek)

Wohletz, K., Heiken G., 1992, *Volcanology and Geothermal Energy*, University of California Press, Berkeley, Los Angeles, Oxford.

USGS\_Hawaiian Volcano Observatory, <http://hvo.wr.usgs.gov/>, Last modification: 27 August 2014 (*pnf*).

- <http://www.newsweek.com/icelands-energy-lessons-85937>, 14 April 2008, link accessed 9 April 2008.
- <http://www.bluelagoon.com/blue-lagoon-spa/>
- <https://www.extremeiceland.is/en/activity-tours-iceland/caving-iceland/volcanic-veins-with-options-caving-tour>

- <http://www.pinterest.com/pin/11962755230700929/>
- <http://www.itshungarian.com/hungarian-secrets/made-in-hungary/the--kemenes-volcanopark-visitor-center-celldomok-hungary/>.
- <http://hvo.wr.usgs.gov/activity/kilaueastatus.php>

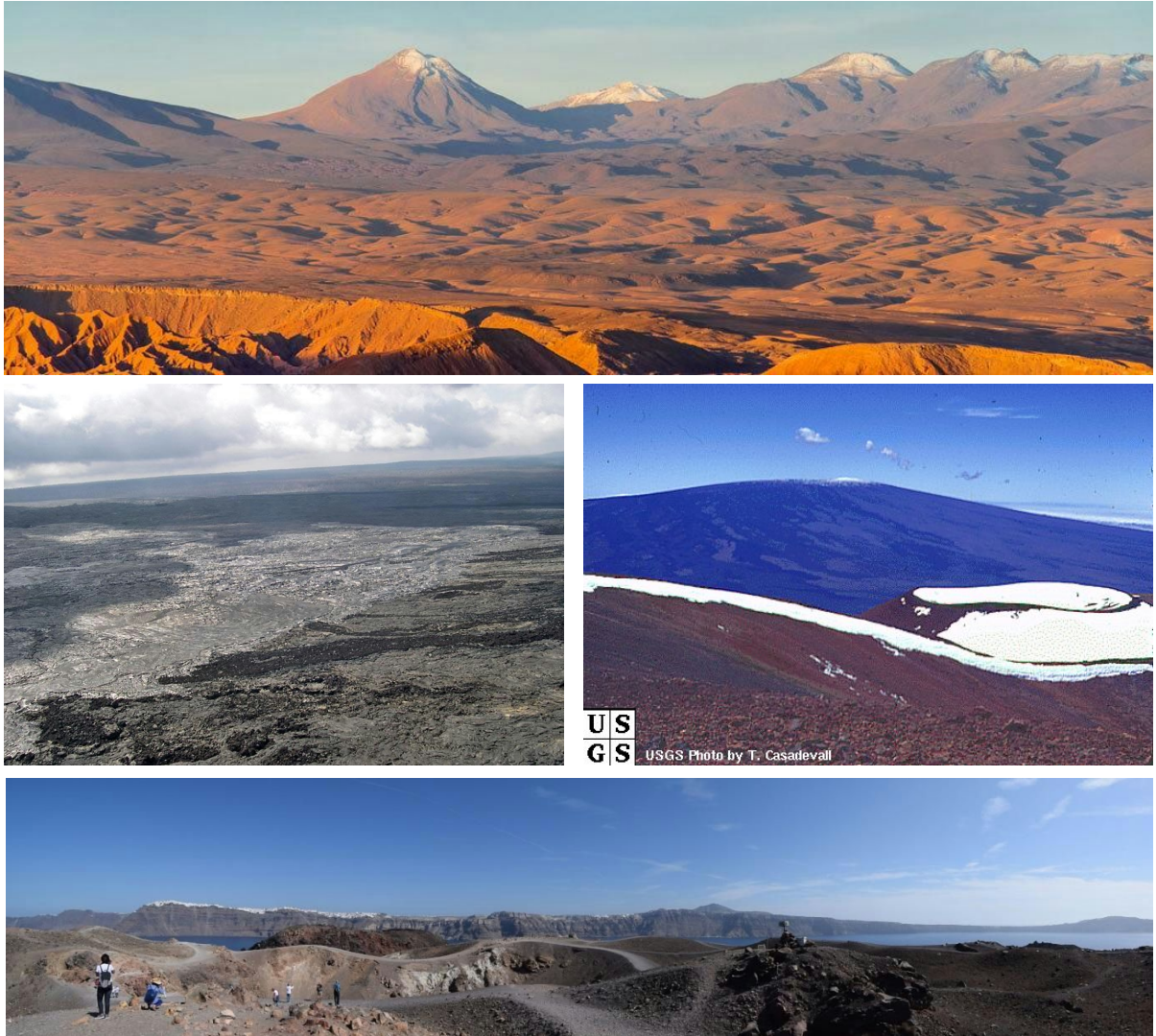


Figure 1. The variety of the landform.

(top: The Licancabur Volcano, Atacama Desert, Northern Chile, von [Katja Birrer](http://reisememo.ch/), <http://reisememo.ch/>, last visit [April 30, 2013](#).

Middle left: USGS Hawaiian Volcano Observatory, <http://hvo.wr.usgs.gov/>, Right: Mauna Loa, USGC, by T. Casadevall.

Bottom: Santorini Volcano, by G. Gkatzimas)



Figure 2. The vivid natural color palette.

Top left: Kilauea Volcano Hawaii, <http://www.nps.gov/havo/index.htm>

Top right: Devil's Cave in Wau O Tapu, New Zealand, by Paul Reiffer, <http://www.paulreiffer.com/2014/02>

Middle: Brightly colored Algal mats in Orakei Korako New Zealand, <http://www.viator.com/Taupo-attractions/Orakei-Korako/d5241-a10430>.

Bottom: Champagne pool, Wau O Tapu, New Zealand.





Geothermal Power Plant, Bjarnarflag, Iceland



Figure 3. The large variety of volcanic products: Geothermal energy, building material, accessories, pottery, cosmetics, nuts.



Figure 4. Well being in Volcanic Parks

Top: Hells Gate Geothermal Park & Mud Bath Spa, Rotorua, New Zealand.

<http://www.newzealand.com/int/plan/business/hells-gate-geothermal-park-and-mud-bath-spa/>

Bottom: Blue Lagoon.



Figure 5. Blue Lagoon Volcanic Park, Iceland

<http://www.bluelagoon.com/blue-lagoon-spa/>



Figure 6. Kemeňes Vulkan Park, Hungary

<http://www.itshungarian.com/hungarian-secrets/made-in-hungary/the--kemeňes-volcanopark-visit-or-center-celldomolk-hungary>