

# AQUASCAPING: CONCEPT AND DEVELOPMENT OF UNDERWATER ECOSYSTEMS

## AQUASCAPING: CONCEPT ȘI DEZVOLTARE A ECOSISTEMELOR ACVATICE

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**Abstract.** *Aquascaping is a creation which is derived from Anglo-American landscape. It is an ancient art and in the same time a new trend, which refers to the creation of aquatic ecosystems. Since the Victorian era, passionate people decorated aquarium with plants and fishes. Aquatic landscape is three-dimensional sculptures immersed in water in an artificial biological system, which are constantly changing, both through growth and deterioration. The components of these creations are: rocks, different accessories, wood, gravel, sand, plants and fishes. These are built taking account the aesthetic principles as: golden section, chromatic harmonies and contrasts similar stage scenery or paintings. This paper presents the appearance and development of these aquatic ecosystems. It also debates some aspects of styles, plants and materials used in this kind of landscapes.*

**Key words:** *miniature gardens, fishes, plants, gravel, sand.*

**Rezumat.** *Aquascapingul este o creație anglo-americană ce derivă din peisagistică. Este o artă străveche și în același timp un curent nou, care face referire la crearea unor ecosisteme acvatice. Încă din epoca victoriană, pasionații de acvaristică decorau acvariile cu plante și pești. Peisajele acvatice sunt sculpturi tridimensionale scufundate în apă, într-un sistem biologic artificial, care se află într-o continuă schimbare, atât prin creștere, cât și deteriorare. Elementele componente ale acestor amenajări sunt: roci, diferite decoruri, lemn, pietriș, nisip, plante și pești. Acestea sunt construite ținând cont și de principiile estetice ca: secțiunea de aur, armonii cromatice sau contraste, similare decorurilor de scenă sau picturilor. Lucrarea de față prezintă apariția și dezvoltarea acestor ecosisteme acvatice. De asemenea, tratează câteva aspecte privind stilurile de amenajare, plantele și materialele folosite în astfel de amenajări.*

**Cuvinte cheie:** *grădini miniatură, pești, plante, pietriș, nisip.*

### INTRODUCTION

Concerning the history of aquascaping, some evidence proves that in Victorian era (around 1856) aquarists have design their tanks with plants and fishes. Later, Dutch hobbyist began the practice of aquascaping and today this art is well developed. Every year some competition is held under the guidance of National Aquarium Society. Aquascaping is the mastery of finding location for aquatic plants and rocks, gravel and wood, in an aesthetic and harmonious way

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inside an aquarium - in essence, it is about gardening under water. However, the main aim of aquascaping site is to create an artistic underwater landscape, the technical aspects must be considered for maintenance and plant development. The aquarium is a closed system, and keeping the water balance is essential for maintaining the landscape (Toma, 2009).

The underwater world is strange and charming. Plants are waving under the influence of the water, fishes are swimming isolated, and colors have a special overtone. The underwater seascape called "aquascape" can captivate and divert attention from the daily stress. Due to the restful of water features, aquariums can be a wonderful addition to any home or office (Park, 2009).

Aquascaping is an art and a science that creates sustainable and amazing underwater environments. It is being essentially underwater gardening and landscaping. It is a new concept which involves plants, fishes, woods and gravel in aquatic ecosystems (Dumitraş, 2008; Toma, 2009).

For creation of underwater ecosystems there are no strict rules. The most common and important styles of aquascaping are the Dutch and Japanese. Dutch style is based on creating a similar design with a picturesque garden using color, texture and size. Japanese style is using rocks, wood and moss to create natural aquatic ecosystems. Many of the principles used in traditional landscape can be applied in aquascaping. The major difference between the two is the level of difficulty in preserving and maintaining the terms of aesthetic value.

Takashi Amano (1992) was the first man who introduced the natural underwater gardens that looked like dreamscapes. He is working to reproduce nature biotopes of special regions.

Asquascaping has derived from a functional practice to a contemporary art form. This art has been most heavily influenced by Takashi Amano, a Japanese nature photographer and the world's most famous aquascaper. He invented and developed the nature aquarium style which emphasizes longevity and harmony among everything present in the tank.

The nature aquarium style is in contrast to the Dutch style aquarium, which emphasizes order and contrast to create a visually striking image (<http://fish-etc.com/aquascaping-main/aquascaping-a-planted-aquarium>).

In this work are presented the concept and developing of aquascaping and some maintenance work of this and also some styles and special aquatic plants.

## **MATERIAL AND METHOD**

Aquarium is an ecosystem, an underwater world. This is very popular in homes and offices can provide the possibilities of incursion to restful and natural world. The increased popularity of underwater design is due to the fact that this can be changed easy over time.

Most of aquarium plants come from tropical and subtropical areas, with a few of warmer parts of the temperate parts. Aquatic plants are able to receive nutrients through whole surface of plant body, especially the epidermis of the leaves. Such typically submerged plants as *Ceratophyllum* and *Utricularia* do not form roots at all, while *Elodea* forms only very short ones. For this reason the composition of substrates

and water are very important; the water must contain mineral substances absorbed directly by the plants (Rataj and Horeman, 1990).

The most important styles are: Dutch and Natural. Over the time have developed other styles: German and Zen.

The Dutch style is using multiple types of plants having different leaves as colors, sizes, and textures are displayed much as terrestrial plants are shown in a flower garden. This style was developed in the Netherlands beginning in the 1930s, as freshwater aquarium equipment became commercially available (Henning, 2003). It emphasizes plants located on terraces of different heights, and frequently omits rocks and driftwood (Fig. 1). Linear rows of plants running left-to-right are referred to as "Dutch streets" (Hudson, 2008).



**Fig. 1** - Aquascaping in Dutch style  
([http://www.aquascapingworld.com/gallery/images/1/1\\_Fluc01.jpg](http://www.aquascapingworld.com/gallery/images/1/1_Fluc01.jpg))

Plant assortment which is used in this style, are the following: *Limnophila aquatica*, some *Hygrophila* species, *Alternanthera reineckii*, *Ammania gracilis* and *Rotala* species (Hudson, 2008). More than 80% of the aquarium base is covered with plants, and little or no substrate is left visible. Tall growing plants that cover the back glass originally served the purpose of hiding bulky equipment behind the tank (Hudson, 2008).

Natural style or Japanese style was introduced in the 1990s by Takashi Amano. Amano's compositions try to reproduce typical Japanese gardens with natural landscapes aspect using asymmetrical arrangement of few species of plants, and carefully selected stones or driftwood.

The utilized plants assortment in this style is with small leaves, such as *Eleocharis acicularis*, *Glossostigma elatinoides*, *Hemianthus callitrichoides*, *Riccia fluitans*, *Versicularia dubyana* or *Taxiphyllum barbieri* are usually emphasized, with more limited colors than in the Dutch style. Because the reason of this style is minimalism the number of species is often limited.

German style is known as a combination of submerged and emerged landscape. A German-style aquatic landscape is also known as the biotope or paludarium (is a combination between aquatic and terrestrial elements). This aquatic landscaping includes a dry area in the aquarium, which basically simulate a river side or pond. The designers of these landscapes start with plants that grow submerged (underwater), then letting them to grow emerged (above water) or out of tank (Fig. 3).



**Fig. 2 - Aquascaping in Japanese style**  
([http://www.blueaquarium.org/wp-content/uploads/2009/09/Top\\_10\\_International\\_Aquascaping\\_Constest\\_2009\\_91.jpg](http://www.blueaquarium.org/wp-content/uploads/2009/09/Top_10_International_Aquascaping_Constest_2009_91.jpg))

Zen style simulates an ancient Japanese garden which gives a feeling of tranquility and balance. Zen style is based on creating sophisticated and graceful arrangements, with aquatic plants and "hardscape" elements (gravel, sand, rocks, roots, wood etc.). The Zen style landscaping rules are exemplified through Bonsai Gardens.



**Fig. 3 - Aquascaping in German style**  
([http://www.aquascapingworld.com/gallery/images/1/1\\_18.jpg](http://www.aquascapingworld.com/gallery/images/1/1_18.jpg))

Zen style shows the relationship between objects, while Natural style simulates a perfect scene from nature. There are old Japanese aesthetic rules that dictate how to design a Zen garden, whether it's a landscape or an aquarium. For example, the place of stones has to be arranged in a specific order to qualify as a Zen garden (Fig. 4).



**Fig. 4 - Aquascaping in Zen style**  
([http://www.swelluk.com/img/blog\\_images/natureaquascape.jpg](http://www.swelluk.com/img/blog_images/natureaquascape.jpg))

## RESULTS AND DISCUSSIONS

Most aquarium designers organize the aquatic landscape to keep about 6 months to reaches its true aesthetic and aquatic landscape vision, but a correctly realized aquascape can beautify for a much longer period of time (Takashi, 1992).

All items for use in the aquascape design should be disinfected before they are placed in the tank. Also, the tank should be completely "cycled" before adding new items. The most frequent elements used in underwater gardens are the following: substrates, rocks, stones, cavework, or driftwood and plants.

The aquariums substrate consists in two components: decorative substrate and nutrient substrate. Its choice is the most important, is the first essential step and the designer must consider when planning an aquarium setting. Decorative substrate is represented by river sand, any kind of construction sand or any form of commercially available. The main criteria for choosing sand is purely aesthetic, it is used mostly for decoration, for fixing the plant, and can be used as clamping surface of denitrifying bacteria. The nutritive substrate is also available in a variety of shapes; it contains nutrients for the plants in aquarium (Hiscock, 2003).

The recommended rocks in aquascaping are purchased from the water. Rivers, streams and lakes are the best sources. These rocks are often more rounded edges and will fit more naturally in the aquarium. Since they come from aquatic medium algae problem will be reduced significant. It is recommended for aquariums design, the following types of rocks: basalt, granite, marble, quartzite, slate, gravel, sand, ballast, gritstone, travertine, limestone, shell limestone, chalk, diatomite (Paulette and Buta, 2009).

In many underwater landscapes the wood is very important. It is used in Dutch and German styles. Wood is a natural floating element, regardless of weight. Wood choice is important, it is recommended a hardwood, and alder tree (even if is soft), but is necessary to be with a good resistance to moisture.

Regarding the plants, it is useful to select plants with different leaves size and colors to create depth and naturalness. Plants with red leaves can create more contrast in the aquarium. At the setting of aquarium the first step is to establish the focal point. Then it is important to place the small and middle plants and in the end the high plants. For background planting it is recommended the following assortment: *Bacopa caroliniana*, *Cabomba caroliniana*, *Crinum thaianum*, *Echinodorus major*, *Egeria densa*, *Limnophila aquatica*, *Ludwigia palustris*, *Myriophyllum hippuroides*, *Rotala macrandra* and *Vallisneria americana*. The following plants are recommended for midground planting: *Althernanthera reineckii*, *Anubias barteri*, *Bacopa monnieri*, *Cardamine lyrata*, *Didiplis diandra*, *Heteranthera zosterifolia*, *Hydrocotyle verticillata*, *Lysimachia nummularia*, *Microsorium pteropus*. For foreground planting, the following assortment is recommended: *Anubias barteri* var. *nana*, *Cryptocoryne willisi*, *Echinodorus tenellus*, *Eleocharis parvula*, *Marsilea hirsuta*, *Sagittaria pusilla*, *Vesicularia dubyana* (Hiscock, 2003).

## CONCLUSIONS

Aquascaping is to create an aesthetically pleasing environment, which needs to select correctly the plants and materials to keep a balance and harmony of the planted aquarium.

This kind of landscapes is suitable for small indoor places with low light.

It can be used not only in private areas but also in hotels, markets and restaurants.

It is important the selection of plants, accessories and substrates to give an easy maintenance. All the materials used for decoration, should not produce changes in the aquarium (change water pH, disturbing water). Before using, the materials must to be disinfected. The selected plants must contribute to the oxygenation of the water and reduce algae.

## REFERENCES

1. **Dumitraș Adelina, Sabo G. M., Singureanu V., Csok E., Moldovan G., 2008** - *Flower species used in aquatic landscape design*, Bulletin USAMV Cluj-Napoca, 65(1), p. 486.
2. **Hennig M., 2003** - *Amano versus Dutch: Two art forms in profile*, Tropical Fish Hobbyist, p. 68–74.
3. **Hiscock P., 2003** - *Encyclopedia of aquarium plants*, Barrons Educational Series Inc., Hauppauge, New York.
4. **Hudson R. P., 2008** - *Going Dutch*, Freshwater and Marine Aquarium Magazine.
5. **Nataj K., Horeman T., 1990** – *Aquarium plants: Their identification, cultivation and ecology*, TFH Publications, Inc., LTD, New Jersey, USA.
6. **Park S. K., Ryong Ch. H., Buta E., Cantor M., Zaharia A., 2009** - *Floral species used in water gardens from South Korea*, J. Plant Develop. 16(2009), p. 59-66.
7. **Paulette Laura, Buta M., 2009** - *Practicum de pedologie*, Ed. Napoca Star, Cluj-Napoca.
8. **Takashi A., 1992** - *Nature Aquarium World*, TFH Publications, Neptune City, New Jersey, USA.
9. **Toma F., 2009** - Floricultură și artă florală. Vol. I-V. Ed. Invel Multimedia, București.  
\*\*\*[http://www.aquascapingworld.com/gallery/images/1/1\\_Fluo01.jpg](http://www.aquascapingworld.com/gallery/images/1/1_Fluo01.jpg)  
\*\*\*[http://www.blueaquarium.org/wp-content/uploads/2009/09/Top\\_10\\_International\\_Aquascaping\\_Contest\\_2009\\_91.jpg](http://www.blueaquarium.org/wp-content/uploads/2009/09/Top_10_International_Aquascaping_Contest_2009_91.jpg)  
\*\*\*<http://fish-etc.com/aquascaping-main/aquascaping-a-planted-aquarium>  
\*\*\*[http://www.aquascapingworld.com/gallery/images/1/1\\_18.jpg](http://www.aquascapingworld.com/gallery/images/1/1_18.jpg)  
\*\*\*[http://www.swelluk.com/img/blog\\_images/natureaquascape.jpg](http://www.swelluk.com/img/blog_images/natureaquascape.jpg)