Total

SI. Family

Generic Names

The Fine Art of Aquascaping

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The ornamental fish trade plays a significant role in the economics of developed as well as developing countries not only as a foreign exchange earner but also as a source of employment. This hobby first appeared in China toward 800. BC with gold fish. Carassius auratus as the starting point. Currently, global trade in ornamental fish including plants and accessories is estimated at about US \$22 billion (Rs. 1.08 trillion). However, the alobal market for the ornamental fish for public aquaria is less than 1% at present. while over 99% of the market for ornamental fish continues to be confined to hobbyists.

Ornamental fishes are the world's most popular pets. So much so, fish keeping has emerged over years as the second most popular hobby after photography globally.

In recent years, the term Aquascaping has come to be focally known among aquarists all over the world. The genesis of this popularity is attributed to one Takashi Amano, who is the innovator of the decorative system in Japan that includes gathering of water plants, stones and driftwood. He popularised the system through his books. Mere decoration of aquaria is no longer the goal of many aquarists. Aquascaping has thus taken over the decorative system in a way.

Aquascaping is an art form now being increasingly practised by aquarium enthusiasts. This art entails arranging of aquatic plants, as well as rocks, stones, cave design and driftwood in an aesthetically pleasing manner within an aquarium. Typically, an Aquascape has fish as well as plants. Although it is possible to create an aquascape with plants alone, or even with rockwork or other hardscape and no plants, it is not done without fish. Although an aguascaper's primary aim is to create an artful underwater landscape, it is necessarily dependent on certain technical aspects of aquatic plant maintenance. In the closed system of an aquarium tank, many factors would have to be balanced so as to ensure the success of an aquascape therein. These factors include filtration.

31.	railily		mber
	A		pecies
2	Acanthaceae Acoraceae	Hygrophilla (14), Ruellia (1), Filtonia(1), Nomaphilla (2) Acorus (1)	18 1
3	Alismataceae	Alisma (1), Baldellia (1), Damasonium (1), Hydrocleis (1)	
•	,	Sagittaria (15), Echinodrus(38), Luronium (1)	´´ 58
4	Amaranthaceae	Alternanthera (5)	5
5	Amarylliadaceae	Crinum (4)	4
6	Apiaceae	Lilaeopsis (6)	6
7 8	Aponogetonaceae	Appropriate (21) Applies (21) Constanting (51) Lagrandia (7) Lagrandia	21
0	Araceae	Anubias (11), Cryptocoryne (51), Lagenandra (7), Lemna (5), Pistia (1), Spathiphyllum (2), Wolffia (2), Wolffiella (1	
9	Araliaceae	Hydricotyle (4)	4
10		Shinnersia (1), Gymnocoronis (1)	2
11	Azollaceae	Azolia (3)	3 5 5 2
	Brassicaceae	Armoracia (1), Cardamine (2), Rorippa (1), Subularia (1)	5
13	Cabombaceae	Cobomba (5)	5
	Campanulaceae Characeae	Lobella (2) Nitella (2)	2
16	Cladophoraceae	Cladophora (1)	1
17	Crassulaceae	Crassula (2)	2
18	Cyperaceae	Cyperus (3), Eleocharis (6), Isolepis (1)	10
	Elatinaceae	Elatine (2)	2
	Eriocaulaceae	Eriocaulon (1), Tonina (1)	2 1
	Fabaceae Fontinalaceae	Calia (1) Fontinalis (1)	1
23	Haloragaceae	Proserpinaca (1)	i
24	Haloragidaceae	Myriophyllum (13)	13
25	Hydrocharitaceae	Blyxa (5), Egeria (2), Elodea (3), Hydrilla (1), Hydrochari	s
		(1), Lagarosiphon(2), Limnobium(3), Najas (6), Ottelia(3)),
26	Hypnaceae	Stratioles (1), Vallisneria (8) Taxiphyllum (1), Versicularia (1), Glossadelphus(3)	35 5
27	Isoetaceae	Isoetes (3)	3
	Juncaceae	Juncus (1)	1
29	Juncaginaceae	Triglochin (3)	3
	Lamiaceae	Eusteralis(1)	1
	Lemnaceae Lentibulariaceae	Spirodeia (1) Utricularia (4)	1
	Linderniaceae	Lindernia (2)	4
	Lomariopsidaceae	Bolbitis (2), Lomariopsis (1)	2 3 1
35	Lycopodiaceae	Lycopodiella (1)	1
36	Lythraceae	Ammania (3) Didiplis (1), Nesaea (1), Rotala (4)	9 6
37 38	Marsileaceae	Marsilea (5), Regnellidium (1) Mayaca (2)	6
39	Mayacaceae Menyanthaceae	Nymphoides (4)	2 4
40	Monosoleniaceae	Monosolenium (1)	1
41	Myrsinaceae	Lysimachia (1)	i
42	Nymphaeaceae	Nuphar (5), Nymphaea (8)	13
43	Onagraceae	Ludwigia (11)	11
44 45	Orchidaceae	Spiranthes (1)	1
	Orontioidceae Parkeriaceae	Orontium (1) Ceratopteris (3)	1
47	Phyllanthaceae	Phyllanthus (1)	3 1
48	Plantaginaceae	Bacopa (7), Callitriche (4), Hippuris (1),	•
	_	Limnophila (7), Littorella (1)	20
49	Poaceae	Hygroryza (1)	1
50 51	Polypodiaceae	Microsorum (1)	1
51	Pontederiaceae	Heteranthera (3), Hydrothrix (1), Pontederia (1), Eichhorinia (2)	7
52	Potamogetonaceae	Potamogeton (10)	7 10
	Primulaceae	Hottonia (2)	2
	Ranunculaceae	Ranunculus (2)	2
	Ricciaceae	Riccia (1), Riccipcarpus (1)	2 2 1 1
	Rosaceae	Synnema (1) Puppia (1)	1
57 58	Ruppiaceae Salviniaceae	Ruppia (1) Salvinia (6)	
59	Samolaceae	Samolus (1)	6
60	Saururaceae	Saururus (1)	1
61	Selaginellaceae	Selaginella (1)	1
62	Scrophulariaceae	Hemianthus(2), Hydrotriche(1), Micranthemum (1)	4
	Trapaceae	Trapa (1)	1
64 65	Typhaceae Zannichelliaceae	Typha (2) Zannichellia (1)	2
55	_u.michichidocae	Editinotiona (1)	1

carbon dioxide supply at sufficient levels to support photosynthesis by the plants underwater, besides taking care of fertilisation, lighting, algae and substrates. There are about 116 genera of aquarium plants, comprising 425 species useful for aquascaping.

Types of Aquascaping

Dutch style: Linear rows of plants running left-to-right are referred to as "Dutch streets." This style was developed and started in Netherlands in the 1930s. during which period freshwater aquarium equipment became commercially available. The Dutch aquarium follows an orderly, often symmetrical arrangement, in which multiple types of plants having diverse leaf colours, sizes and textures are displayed in much the same way as terrestrial plants are shown in a flower garden, it displays plants located on terraces of different heights, but these displays omit rocks and driftwood often. Tall growing plants that cover the back glass originally served the purpose of hiding bulky equipment in the tank. Plant rows do always give a positive visual effect. Good plants for Dutch style plants rows are Lobelia cardinalis, Limnophila sessiflora and L. aquaticum, most Ludwigia sp., Michrantemum michrantemoides and Umbrosum sp. Java ferns and java moss can also be a good choice if they are exhibited with terraces. In Dutch style a plant must never grow taller then a plant behind it.

Nature Aquarium Style: A contrasting approach is the nature aquarium style, introduced in the 1990s by Takashi Amano of Japan who made this style very popular with his three-volume series of books, 'Nature Aquarium World' and in his aquascaping competition. Because of this style of aquascaping he is regarded as the most influential aquascaper in the world. Amano's compositions draw on Japanese gardening techniques that attempt to mimic natural landscapes by the asymmetrical arrangement of masses of relatively few species of plants, and carefully selected stones or driftwood. The Nature Aquarium Style is designed to keep aquascapes simplistic and natural looking. However, despite the simplistic approach, aquascapes following this style are far from having simplistic look. This style draws particularly from the Japanese aesthetic concepts of Wabi-sabi, which focuses on transience and minimalism as sources of beauty, and Iwagumi, which sets rules governing rock placement. Plants with small leaves are usually selected, with more limited colours than in the Dutch style, and fish or freshwater shrimp are usually selected to complement the plants and to control algae.

Biotopes: Biotope aquascapes are designed to replicate exactly a particular aquatic habitat of a particular geographic location, and not necessarily to provide a garden-like display. Plants and fish need not be present, but if they are, they, as well as any gravel and hardscape, must match what would be found in nature in the habitat being represented.

Zen/Japanese Aquascaping: Japan has been known for Ikebana (Japanese flower arranging) and Bonsai for ages. However, but now planted aquaria are coming on to the scene. To the westerner, a planted tank might just be used for biological balance and not just for aesthetic virtue. In contrast, for the Japanese, the art of planted aquaria must be structured. organised, and disciplined. Takashi Amano and Doshin Kobayashi are among a few Japanese aquarists that have made it into the western culture. These two men alone have raised the quality of planted freshwater aquaria. In order to explain the design and style of Japanese planted aguaria, one must know Japanese Buddhist religion. society, and culture at least to the extent needed. Many aspects of religion, namely Zen Buddhism, are incorporated into freshwater plant arrangement and placement. For instance, large stones that are used in the aquarium should always be in odd numbers, i.e. 1, 3, 5 and so on. Zen itself draws a lot from nature, so it is no surprise that Zen has an influence on aquascaping.

German Open Style / Paludariums:

This style is more known as a combination of immersed and sub — immersed sets up. This is also known as German Open Style, as a biotype or a type of Paladarium. The aquascapers of these layouts often start out with aquatic plants growing submerged and then allow them to grow immersed outside of an aquarium. The intended goal is to create a slice of nature that is more indicative of what you would find in a riparian environment, like at the edge of a waterway in the Amazon jungle.

El Natural Style: The El Natural Style is designed and promoted by Diana Walstad who is a well known ecologist and author. This style is sharply different from other aquascaping layouts. Although the El Natural Style is more of a plant growing

technique that involves using natural light, potting soil, and few water changes, these aquaria often have their own flavour and aquascaping style.

Taiwanese Style

This style is another style that has been overshadowed and lost over the years. The Taiwanese style draws from Dutch Gardens, Zen Gardens and Amano's Nature Style to create aquascapes with high terraces and depth. Besides the terracing, small figurines, structures or other objects placed in the aquascape are also telling of when this style is employed. The overall goal is to create a living landscape.

Wabi-Kusa Style

Another style with roots from Japanese Aquascapers, the Wabi-Kusa style focuses on creating a submerged/immersed garden. Imagine taking a bonsai garden and submerging half of it under water. The plants in this style are grown and centered on a ball of soil, and then placed in a container. Many Wabi-Kusa aquascapers create an island ball of plants surrounded by open water.

Aquascape Planning

Imagination is the key to aquascaping. When planning an aquascape, the first thing to do is to sketch it out on paper. It helps to see what will work ahead of time. For decorating background, cork, wood, paints or adhesive foliage will be used. When painting or using foliage, black or blue background must be used. This provides to the tank a great contrast and also make it easy to concentrate on the tank itself. For natural look of an aquascape, pink, blue, bright green, brown, gray or black gravel should be used. Before going for tank setting, at first entire tank should be cleaned with potassium permanganate (KMnO₂) and washed thoroughly with water. After application of KMnO, tank is rewashed for three to four times. The selected sand/gravel is first soaked in water for 1-2 weeks to remove salts and dirt. Then it is washed thoroughly with water and then with KMnO,. Repeated washing is done after KMnO, application to remove traces of KMnO,. The dirt free sand/gravel is cleaned and then spread at tank bottom. The first layer of sand is spread in all tank bottoms. At front side it is at 10 mm and at back it is spread at 30 mm, so as to make a slope from back to front. Many commercial liquid and powder fertilisers products are available for aquascape. These



Shapes and Sizes

fertilisers should be used to complete natural cycle by useful bacteria i.e., Nitrosomonas, Nitrobactor etc. Then the tank may be filled with dechlorinated water up to half of the tank. Thereafter this may be kept for one day and next day the tank may be cleaned with seasoned KMnO₄ and treated drift wood. Then stones are placed as per the aquascape design, to be the focal point. Following points should be kept in mind while going for setting an aquascape.

Selection of Shape of Aquascape Layout

There are several composition types: The concave setup (high on either side and low in the middle), the convex setup (the opposite of the one above, so low on both sides and high in the middle) and the triangular setup that is high on one side, getting lower to the other.

One or at the maximum two focal points should be set for smooth appearance of an aquascape that pleases our eyes, either a stone, or a piece of driftwood, or beautiful (group of) plant(s). Many people tried to put the most beautiful of their plants right into the middle of tank. That is because when we have a symmetrical aquascape, our eyes tend to wander from left to right and back, forth and back. This is not the relaxed atmosphere one would be looking for when he sits in front of his tank and watch it for hours. Greek philosophers and mathematicians found out that the best ratio that pleases eye is 1:1.618. To find out focal point of tank, the length of tank may be measured and divided through 2.618. The resulting value may then be measured from one side of the tank and market. This point is the place of focal point where the very special 'centerpiece' is located. More than 2 focal points may never be created.

Selection of accessories

The perfectly shaped and beautiful piece of driftwood and stone is what aquarists have been looking for long time, especially when making a setup with stones. It is much more important to use different sizes of the same type, than just take one very beautiful stone. One single stone in a tank will always look artificial, but when stones, two or more, are placed they look natural. That is what are usually seen in nature. Generally a triangular arrangement looks good (if the stone are at least three) with the biggest one usually being the focal point. Different types of stones

or driftwood should never be used in a single aquascape. Special care should be taken on where to place them.

Growth Pattern and Planting Order

Stem plants that grow tall are usually placed at the rear and sides of the aquarium. When planting these, they may be planted at least two inches away from the side and back. This allows leaves of the plant to spread and not jam the glass and provides a natural corridor for the fish. The midground goes for plants that will sit under some of the stem plants (lower light plants) and provide a focal point to the aquascape either with driftwood and rocks or as a stand-alone focal point. In the foreground, such of the plants that will cover the substrate and stay low to the surface of the substrate may be planted.

While planting first plant it may be in the area of focal point (place), then the low growers, mid growers and in the end the high plants may be planted. Especially stem plants are a good way to form aquascape when planted very dense. Many small leaved species, such as Micranthemum micranthemoides, M. umbrosum, Mayaca sellowiana or Rotala indica, to just name a few, can easily be trimmed to a desired shape. Two to three stems may be taken and planted with tweezers, about an inch beside the next plant bundle of two to three stems, and so on. The dense the plants are in the beginning. the faster they will grow in the tank. Especially in the initial stage it is wise to cut the tops, replant the cuttings between the old ones while leaving the rooted parts in the substrate. The rooted parts will bud new shoots within a short time and it is easy to propagate plants in the tank itself.

Plant Colour

Different shades are used to make each species stand out on its own identity and lend itself to the attractive look at background of tank. Dark next to light, subtle shades next to each other, and usually one dominate red plant and possibly a subtle red somewhere else. While plating, the midground may always be planted with plants that have slower growth and offer different shades and textures, and with a plant group with or without driftwood or rocks, set as a focal point. Combination of two plants of different colours can be used to cover the substrate foreground. Uncovered substrate in well chosen foreground areas can lend to the colour scheme as well.

In an aquascape, generally small and narrow teaves look better, plants with larger leaves go better next to fine leafed plants, smooth leaf plants go well next to crinkled leaves, and of course tall in the back but different height background plants that fill spaces but leaving spaces in between are more interesting than all of the same height. The same can be said for midground. An Anubias large leaf plant can be a striking addition to a small group of smaller leafed midground plants. Depending upon the fish swimming levels plant shape should be chosen. Shy fish needs places for hiding while schooling fish need some open areas to swim together.

Selection of Plants for the Aquarium

Selection of plants for an aquascape is most important. Plants that would make good contrast may be selected; large leaves against small leaves, oval leaves against lanche-shaped, red against green and so on. The tallest plants must be put at the back or the sides, small plants in the front, or may be built terraces in the middle layer aquarium plants for Aquascaping. These are categorised hereunder:

Aquarium Carpet Plants (1-10 cm): These plants are suitable as carpet to cover foreground at aquarium bottom. Some of such plants are Pygmy Chain Sword (Echinodorus tenellus), Dwarf Hairgrass (Eleocharis parvula). Glossostigma (Glossostigma elatinoides), Hemianthus 'Cuba' (Hemianthus callitrichoides), Brazilian Micro Sword (Lilaeopsis brasiliensis), Crystalwort (Riccia fluitans), Willow Moss (Fontinalis antipyretica), Java Moss (Vesicularia dubyana). These can be replaced with Indian plants of similar form.

Small Aquatic Plants (1-20 cm): The plants suitable are Dwarf Anubias (Anubias nana), Afzeli Anubias (Anubias afzelii), Green Wendtii Crypt (Cryptocoryne wendtii 'green'), Brown Wendtii Crypt (Cryptocoryne wendtii), Undulated Crypt (Cryptocoryne undulata), Willisii (Nevillii) Cryp (Cryptocoryne x willisii), Water Hedge (Didiplis diandra), Needle Spike Rush (Eleocharis acicularis), Pearl Grass (Hemianthus micranthemoides), Whorled/ Marsh Pennywort (Hydrocotyle verticillata), Baby Tears (Micranthemum umbrosum), Windelov's Fern (Microsorum pteropus 'Windelov'), Nanjenshan Rotala (Rotala sp.'Nanjenshan'), Water Cabbage (Samolus parviflorus). These can be replaced with Indian plants of similar form. 🕼



Fig.1: A Dutch style aquascape. This aquascape was made by Shyn Fertig, Israel (Image under free license of Wikimedia)



Fig.2: A nature Aquascape by Japanese aquascaper Takashi Amano. Photo courtesy Takashi Amano



Fig.3: A German open style/ Paludarium at Hans Paludariums. Photo courtesy Hans Pietersma

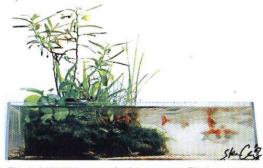


Fig.4: A Wabi-kusa style Aquascape. Photo courtesy Steave Chong, Hawaii



Fig.5: A Zen Aquascape. Photo courtesy P.J. Magnin

Medium Aquatic Plants (15-30 cm): These plants are suitable for midgorund are: Amazon Frogbit (Limnobium laevigatum), Giant Anubias (Anubias barteri), "Coffee Leaf" Anubias (Anubias barteri 'coffeefolia'), Blyxa Echinosperma (Blyxa echinosperma), Blyxa Japonica (Blyxa japonica), African Water Fern (Bolbitis heudelotii), Cyperus

helferi (Cvperus helferi), Porto Alegre Sword (Echinodorus portoalegrensis), Eusteralis (Eusteralis stellata), Broad Leaf Flame Ivy (Hemigraphis colourata 'broad leaf'), Brazilian Pennywort (Hydrocotyle leucocephala), Lobelia (Lobelia cardinalis). Golden Moneywort (Lysimachia nummularia 'Aurea'), Fern Java (Microsorum pteropus) Whorly Rotala (Rotala wallichii), Dwarf Sagittaria (Sagittaria subulata), Lizard's Tail (Saururus cernuus). These can be replaced with Indian plants of similar form.

Tall Aquatic Plants (31+ cm, thin): The plants suitable are: Lilacina (Alternanthera reineckii var. lilacina), Bog Scarlet Hygro (Alternanthera sessilis var. rubra), Pink Ammannia (Ammannia gracilis), "Hairy" Bacopa (Bacopa lanigera), Dwarf Bacopa (Bacopa monnieri), Green (Cabomba Cabomba caroliniana), Chinese Ivy (Cardamine lyrata), Elodea (Egeria Densa), Stargrass (Heteranthera zosterifolia), Dwarf Hygrophila (Hygrophila polysperma), Sunset Hygro (Hygrophila polysperma 'Rosanervig'), Dwarf Ambulia (Limnophila sessiliflora), Needle Leaf Ludwigia (Ludwigia arcuata), Narrow Leaf Ludwigia (Ludwigia repens x arcuata), Creeping Red Ludwigia (Ludwigia repens), Red Ludwigia (Ludwigia mullertii), Tilted Red Ludwigia (Ludwigia inclinata), Oval Ludwigia (Ludwigia ovalis), Glandular Ludwigia (Ludwigia glandulosa/ perennis), Madagascar Lagarosiphon (Lagarosiphon madagascariensis), Mayaca (Mayaca fluviatilis), Brazilian Milfoil (Myriophyllum aquaticum), Western Milfoil (Myriophyllum hippuroides), Red-Stem Milfoil (Myriophyllum matogrossensis), Southern Waternymph (Najas quadalupensis). Gavii (Potamogeton gayii), Mermaid

Weed (*Proserpinaca palustris*), Dwarf Rotala (*Rotala rotundifolia*), Giant Red Rotala (*Rotala macrandra*), Tonina (*Tonina sp.*), "Corkscrew" Val (*Vallisneria spiralis* var. *tortissima*). These can be replaced with Indian plants of similar form.

Large Aquatic Plants (31+ cm, wide): Madagascar Laceleaf (Aponogeton madagascariensis), Orchid Lily (Barclaya longifolia), Water Sprite (Ceratopteris thalictroides), Broad-Leaf Water Sprite (Ceratopteris cornuta), Eichhornia (Eichhornia azurea), Sword (Echinodorus Amazon amazonicus), Ruffled Amazon Sword (Echinodorus martii (maior)), Ozelot Amazon Sword (Echinodorus x. 'Ozelot'), Giant Hygrophila (Hygrophila corymbosa), Water Wisteria (Hygrophila difformis), Red and Blue Water Lily (Nymphaea stellata), Rubra Water Lily (Nymphaea sp. "rubra"), Small-Flower Water Lilv (Nymphaea micrantha), Banana Plant (Nymphoides aquatica), Tape Grass (Val) (Vallisneria spiralis). These can be replaced with Indian plants of similar form.

Floating Aquatic Plants: The suitable plants are ~ Duckweed (Lemna sp.), Water Lettuce (Pistia stratiotes), Aldrovanda (Aldrovanda vesiculosa), Azolla (Azolla filiculoides), Floating Watermoss (Salvinia natans), Eared Watermoss (Salvinia auriculata), Asian Watermoss (Salvinia cucullata). These can be replaced with Indian plants of similar form.

Maintenance: Management of an aquascape is related to how much of time is available to spend to observe the aquascape concerned. In case very little time is available then one should opt for low maintenance plants like slow growers, less stem plants (fast growers), and those with more manageable growth. Trimming of plants should be done mostly with water changes as it is easier when water level is less.

Fishes: It is better to choose schools of small fishes than just a few different big ones. A huge school of Tetra or Rasbora will make the tank look much bigger. Fish that would not disturb aquascape have to be chosen.

It is desirable to start with copying an existing aquascape. Soon after this, one will get ideas in respect of right plants, the stones to be chosen and placed correctly and creating some free space which would give the appearance of depth to the aquascape.