FLUIDRA

LAKES AND LAGOONS

for Hospitality and Real Estate



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01
Introduction

02
Lakes and lagoons in hospitality and real estate

03
An ideal leisure solution

04
Fluidra's lagoon solutions and their benefits

05
Design, maintenance and water treatment systems for Fluidra lagoons

06
Product equipment to optimize Fluidra lagoons

07
Conclusion

01 INTRODUCTION

Within both the real estate industry and the tourism sector, the search for a unique selling point is always on. Condominium properties or hotels and resorts looking to differentiate themselves by offering innovative features can use artificial lakes and lagoons as the perfect means to offer something special to their end users.

Lakes and lagoons are excellent long-term investments that increase a property's value, add new revenue streams, and enhance their attractiveness. This is why Fluidra offers high-quality water ecosystems of this type, adapted to bathing, water sports and sailing**.**

In this e-book, we will cover:

- **The definitions of lakes and lagoons and their relationship with the hospitality and real estate sector;**
- **Why lakes and lagoons are ideal leisure solutions in these settings;**
- **Benefits of Fluidra lagoons;**
- **Information on how Fluidra lagoon solutions are constructed;**
- **Essential considerations for designing and maintaining a lagoon;**
- **The best equipment to optimise the use and maintenance of lagoons on real estate and hospitality properties.**

02 LAKES AND LAGOONS IN HOSPITALITY AND REAL ESTATE

To understand how lakes and lagoons can be used in the hospitality and real estate sectors, we need to first look at the definition of these water features and how they interact with the two different industries.

What are artificial lakes and lagoons?

Lakes and lagoons are among the trends that are making a splash in the market, especially in the hospitality industry, which is focusing on offering additional value to consumers.

We refer to lagoons as man-made structures that aim to recreate a **coastal paradise**. It's an innovative and versatile solution, as well as a unique way to enhance outdoor recreation spaces. Lagoons can be adapted to various available shapes and sizes thanks to Fluidra's proprietary sustainable technology. They also accommodate a wide range of **activities and surrounding services**, diversifying customers' reasons for spending time at a particular resort hotel.





Depending on their size, lagoons can be used for **water sports**, allowing guests or residents of a property not just to swim but also to kayak, paddleboard, sail in small boats, and more.

Artificial lakes, on the other hand, are primarily **ornamental** and cannot be used for swimming or bathing. They are great features for adding a touch of luxury to an outdoor or indoor setting and can include **water shows and fountains**. While not appropriate for swimming, artificial lakes can accommodate sailing and surfing.

03 AN IDEAL LEISURE SOLUTION

What makes lakes and lagoons are great features for tourist and real estate environments because they transcend mere landscaping. These water features **enhance the value and attractiveness** of the surroundings while also accommodating a wide range of activities.

As a result, artificial lakes and lagoons increase the value of urban living spaces, provide tourist resorts and hotels with a unique selling point, and add a decorative element that increases the architectural appeal of buildings and outdoor spaces alike.

Why are lagoons a perfect addition to real estate and hospitality business?

Primarily, the real estate and the hospitality sectors stand to gain the most from these water features due to their similar focus on human experience.

Both sectors rely on a pleasant consumer experience for their success, with a focus on wellness, sports, leisure, comfort, and aesthetics. In the case of the hospitality sector this comprises hotels and resorts that enhance the travel experience with gyms, swimming pools, water features, and outdoor and indoor leisure facilities, including artificial lakes and lagoons. The hospitality industry also includes food and drink services, event planning, theme parks, and more—all of which are amenable to incorporating water features.

In **real estate**, properties are designed to provide long-term accommodation: either as a home or a fixed-term temporary arrangement. The focus here is on providing features that can be enjoyed individually or, more frequently, on a shared basis by members of a residential community. The latter usually takes the form of condominiums with shared pools, lagoons, garages, multi-purpose spaces, and more.





Why a Lagoon?

- Great blend with the landscape
- Sensation of being in the sea
- Return of investment
- Multifunctional solution
- Different depths ideal for all family
- 100% Customized designs

Why a Lake?

- Great blend with the landscape
- Return of investment
- Multifunctional solution
- 100% Customized designs

As already covered, these aquatic features are not only aesthetically pleasing but are also destinations for sporting activities.

Finally, from a value standpoint, aquatic ecosystems provide four key advantages:

- **Value for the owner:** through the products and services they provide, such as the water, the aquatic plants, etc;
- **Value for users:** Enjoyment of sports and leisure, water quality, etc;
- **Value for the region:** The ROI for companies investing in these features trickles through into the wider economy;
- **Value for society:** The sum of the value for the users and for the owner.

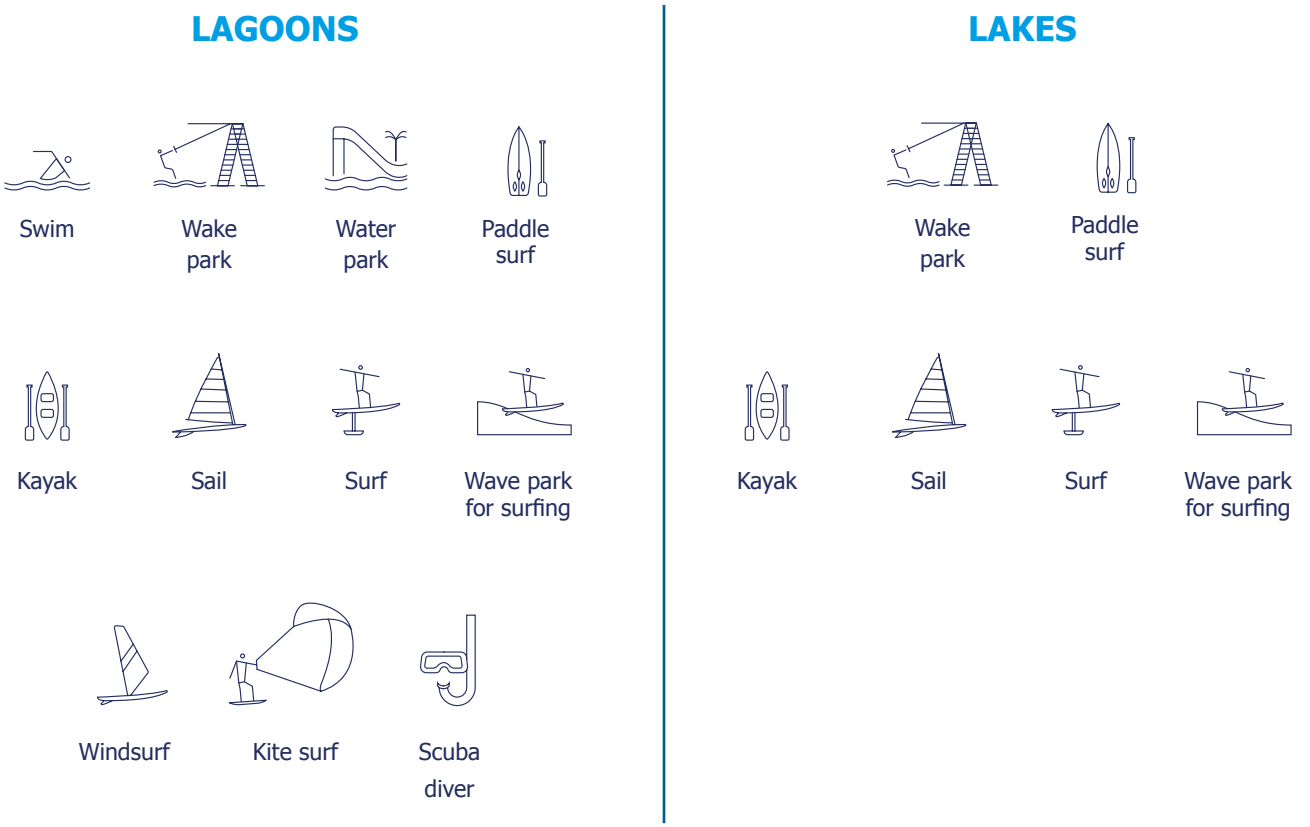
04 FLUIDRA'S LAGOON SOLUTIONS AND THEIR BENEFITS

In line with the multifunctionality covered above, Fluidra lagoons lend themselves to a wide range of applications and locations, especially in hotels and resorts. However, they also add value in public parks, shopping centres, golf courses, water parks, water sports events, and even zoos or aquariums.

The diagram below shows the various sporting activities a lagoon can host:

Wide range of sports

Our lagoons are safe spaces, with no dangerous currents or jellyfish. They provide recreation and fun for the entire family, with multiple opportunities for both rest and relaxation, as well as sports, including kayaking, wakeboarding, and paddle surfing.

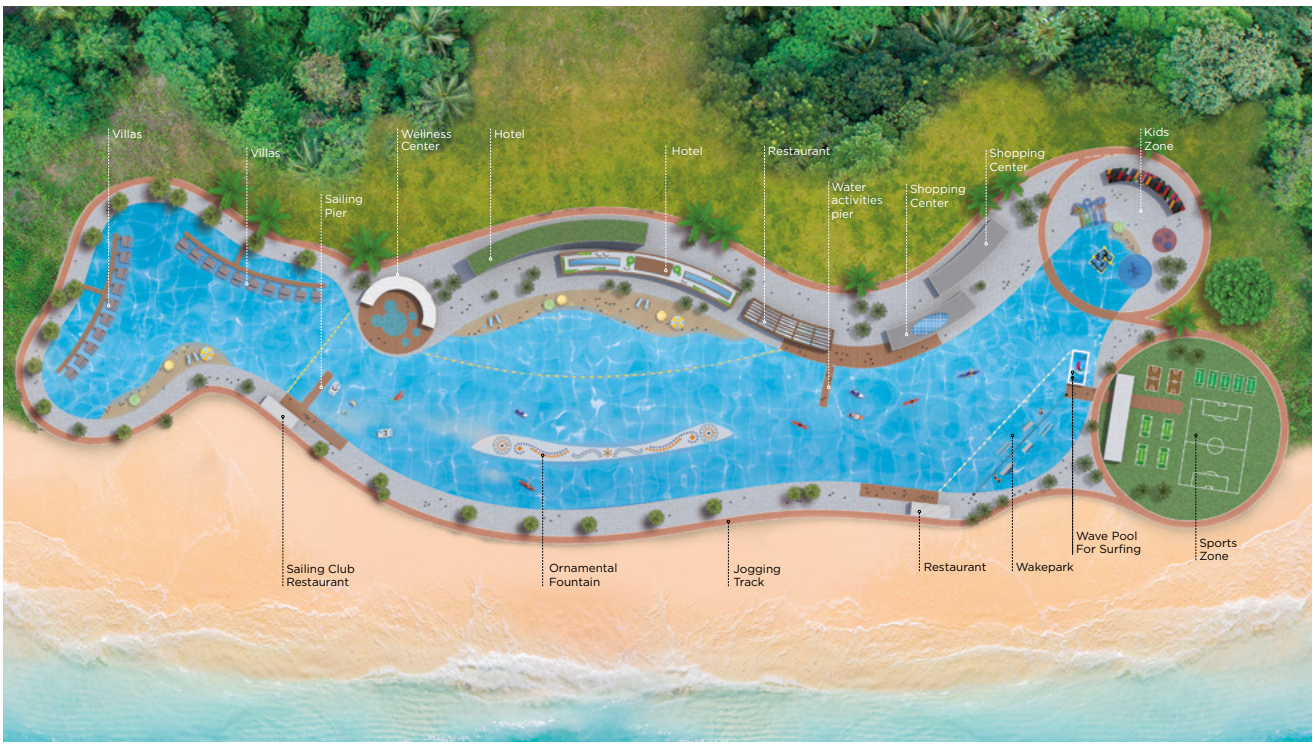


Owners and operators of extensive properties can use the lagoons as a means to offer a space for entertainment, leisure and business. These spaces are **highly profitable**, bringing beach life to urban and natural spaces alike. Through a lagoon, **owners and operators can establish multiple sources of income**: entrance tickets, participation in water sports, family activities, restaurants, bars, retail, concerts, trade shows, private clubs, and other events, including weddings.

Lagoons also offer a perfect starting point for **additional services and businesses** that could be part of the same property or hotel resort, or be invited by third parties that pay rent to the owner of the lagoon property.

Lagoons can be developed with **different levels of infrastructure**, starting small and growing to multiple **beach areas**. As they become more established and widely used, owners can look to add other income opportunities like paid parking, further accommodation, theatres and shows, etc. With a lagoon, real estate owners can make a **moderate investment with optimal maintenance**, which makes them a highly profitable business model.

Additionally, lagoons create the potential for **advertising and sponsorships** for brands associated with the lifestyle they promote.



Enlarged detail on the following pages.

From an environmental standpoint, lagoons are a **sustainable space** that brings nature and outdoor pursuits to the heart of urban and residential areas, thus reverting the urban heat island effect.

Finally, thanks to Fluidra's **maintenance and water treatment solutions**, our lagoons are clean and safe. These solutions are for low cost with a low environmental impact, extending the bathing season with optimal temperature even outside the peak summer season.


Villas
Villas
Sailing
Pier
Wellness
Center
Hotel
Sailing Club
Restaurant
Ornamental
Fountain


Hotel
Restaurant
Water activities pier
Shopping Center
Shopping Center
Kids Zone
Jogging Track
Restaurant
Wakepark
Wave Pool For Surfing
Sports Zone

Benefits of Fluidra lagoons:

Attractive to potential users

A lake or lagoon is a great addition to real estate or hospitality spaces, with all kinds of services and possibilities for potential users. These features stand out from the competition and will attract more guests, diversifying and increasing the customer base.

Increased value and accelerated ROI

The inclusion of a lake or lagoon in your project will increase the value of the property and boost the return on investment due to the additional associated services and activities. These features also justify a higher average room rate.

Multifunctional areas with enhanced user experience

These features are designed to be surrounded by a wide range of services and activities such as kayaking, swimming lessons, water shows, cocktail bars, or sunbeds, among others. These different possibilities make a lagoon a great multifunctional space for the whole family and for all types of guests.



Sustainable, efficient and adaptable

Our extensive experience in developing lake or lagoon projects allows us to provide solutions adaptable to any space. With state-of-the-art designs and adapted water treatment options, our lakes and lagoons are conceived with a sustainable, hygienic, and efficient approach. This facilitates greater ease of management and peace of mind for the operator.

Ornamental and refreshing effect

Aside from the business benefits and user experience that lakes and lagoons provide, they increase the aesthetic appeal of hotels, resorts and other properties. They also contribute to the natural environment and the property's brand image.

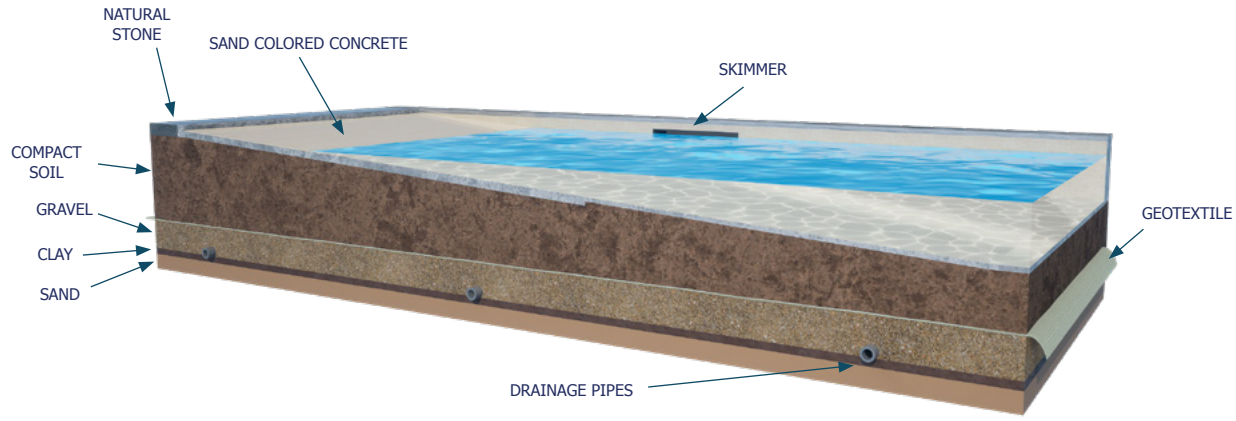


05 DESIGN, MAINTENANCE AND WATER TREATMENT SYSTEMS FOR FLUIDRA LAGOONS

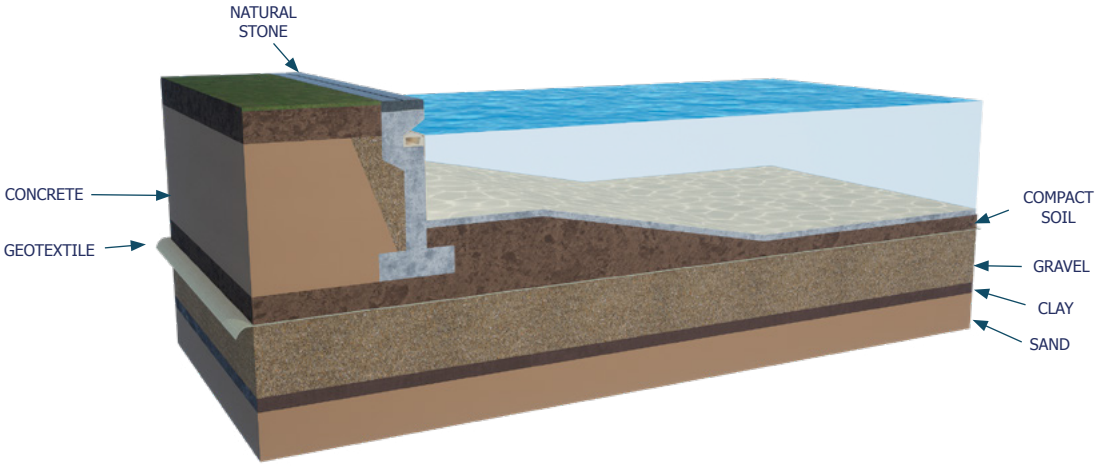
Beach zones and perimeter walls

Fluidra's man-made lagoons feature distinct solutions to create an appealing shoreline, providing both beach zones and pool-like perimeter walls. This allows us to offer flexible design options for various landscapes and architecture. To accommodate a wide range of activities, Fluidra lagoons usually feature a maximum depth range between 1.5 and 2 metres, with a waterproof PVC liner at the bottom.

The **beach zones** replicate a natural shoreline, providing a gradual slope into the water, which enhances user safety and creates **an inviting transition from land to water**, invoking the feeling of a naturally-occurring paradise. A double layer of protection, formed by a concrete base and a liner, ensures the lagoon is watertight.



The **perimeter walls**, typically located in **deeper sections**, provide structural integrity. This supports the lagoon's shape while helping to define specific areas for different uses, such as swimming or wading, and restaurant and bar areas. This feature is composed of a concrete wall and optional stone coping.



Optimized piping and water return systems

A critical aspect of Fluidra's engineering innovation is the optimized piping system, which improves **hydraulic efficiency** and reduces energy consumption. **Wall and bottom nozzles** circulate water throughout the lagoon, ensuring complete and uniform water circulation. This even distribution of water helps to **avoid stagnation** and maintains water quality, supporting the overall performance of the lagoon's filtration and disinfection systems.

By optimizing the piping layout, Fluidra minimizes pressure losses, which is particularly important in large-scale projects. This approach results in a more energy-efficient system, reducing operational costs while ensuring the water's pristine condition.

Strategically-located technical rooms

Fluidra strategically places **multiple smaller technical rooms around** the lagoon. This is a key engineering strategy to house critical equipment such as pumps, filters, and control systems. By distributing technical rooms in proximity to specific lagoon areas, Fluidra **reduces the length of piping required**, further decreasing friction losses and energy use.

Additionally, these technical rooms are thoughtfully integrated into the surrounding landscape to remain **hidden from view**, maintaining the lagoon's visual appeal while ensuring easy access for maintenance and operational efficiency. This approach is particularly beneficial in high-density developments, where space is at a premium and mechanical systems need to be discreet.

Water recirculation and filtration systems

Fluidra's man-made lagoons use an advanced aspiration and impulsion system to maintain the highest water quality standard. Water is aspirated through a combination of **surface skimmers and bottom drains**, ensuring both floating debris and settled sediments are removed. Typically, around 70-80% of the water is aspirated from the surface via skimmers, which capture leaves, insects, and other floating contaminants. The remaining 20-30% is drawn from the lagoon floor via bottom drains, preventing the buildup of heavier particles and ensuring complete water circulation.

Once collected, the water is directed to the filtration systems, including **sand or regenerative media filters** (e.g., perlite). Sand filters combine water and air during the backwashing process, reducing water waste by up to 50% compared to conventional systems. Regenerative filters use significantly less water—around 2 liters per filter per backwash cycle—making them a highly sustainable option. The use of flocculation systems is also a great addition to enhance the filtration systems' performance.

After filtration and disinfection, the water is returned to the lagoon through **impulsion nozzles located along the walls and base of the lagoon**, promoting thorough circulation and preventing dead zones. The entire water turnover, from aspiration through to disinfection, typically takes 6 hours. However, this can vary depending on the size and design of the lagoon.



Disinfection water treatment in freshwater and saltwater lagoons

Disinfection is a critical part of the water treatment process, ensuring that the lagoon remains hygienic and free from harmful pathogens. The approach to disinfection varies depending on whether the lagoon uses freshwater or saltwater:

- **Freshwater lagoons:** Disinfection in freshwater lagoons is typically managed using **chlorination systems** similar to those employed in swimming pools. In addition to chlorine, UV disinfection systems are often installed to provide a secondary treatment layer. This dual approach ensures that the water is kept safe for users while maintaining water clarity.
- **Saltwater lagoons:** Saltwater lagoons rely on **electrolysis** to generate chlorine naturally from the salt dissolved in the water. This process is more environmentally friendly than traditional chlorination, eliminating the need for chemical storage and handling. Additionally, saltwater systems are often supplemented with UV treatment to enhance disinfection further while minimizing chemical use.

In both cases, the water is continuously monitored and adjusted through automated control systems, ensuring consistent water quality and compliance with local health regulations.



"Water quality for lakes and lagoons should always be at optimal levels"

06 PRODUCT EQUIPMENT TO OPTIMIZE FLUIDRA LAGOONS

Choosing top-tier and properly-sized equipment is key in order to conceive an efficient and optimal lagoon installation. Here is the equipment we recommend:

Rodas and Praga filters





These high-performance bobbin wound filters are made from fiberglass and polyester resin for a maximum working pressure of 2.5 to 4 kg/cm2. They are totally anti-corrosive and have high mechanical, chemical, and thermal resistance. Higher quality water is achieved dueto their greater filtering capacity, while turbidity and contaminants in the filtered water are reduced via their increased retention capacity. The time between backwashes increases proportionally with the height of the filter bed, meaning there are fewer interruptions in filtration. and lower water consumption. This is because the number of backwashes needed is decreased, and there is less erosion of the filtering material. A large horizontal filter such as Rodas is the ideal choice in cases where a great volume of water needs to be treated. In the case of small to medium lagoons, Praga filters are an ideal option.

Their maximum operating temperature is 50ºC, with different diameters for connections and drains. They also feature a side opening for unloading the filtration medium and facilitating access to the interior. Greater efficiency of filtration and washing is obtained from the optimal combination of sand and/or gravel recommended for underlayers of 1.2 meters or more, lowering the loss of load and increasing the retention capacity.

Sand and/or gravel as the main filter media



The filter media is the material that the pool filter contains. When the water enters the filter, it passes through and leaves any suspended particles behind.

Sand and gravel (silica) are, without a doubt, the most efficient and commonly used filter media in lagoons. Due to its irregular shape, silicaThey retains any dirt in the water when it passes through. Sand needs maintenance as it eventually forms channels that lead to poor filtration. Another challenge is the sand's high capacity to trap bacteria and microorganisms, which can proliferate inside the filter. That's why it is important to carry out thorough maintenance and regular filter media replacement to ensure proper filtration.

Regenerative media filters



Praised for its exceptional efficiency and sustainability, this innovative system uses perlite as filter media to effectively trap dirt particles. The distinguishing feature of regenerative filters lies in their flexible, perlite-coated tubes. These tubes capture particles on their surface; when the perlite reaches saturation, the filter undergoes a remarkable self-regeneration process through vibration. This unique mechanism contributes to significant energy savings. Additionally, they play a crucial role in minimizing chemical usage.

KIVU and Aral Plus pumps



The KIVU® is a high performance pump ideal for high flow rates (1500rpm) and large water installations. Available in plastic self-priming models or in a centrifugal model, this pump is a great choice both for freshwater and saltwater lagoons. It has been designed to achieve the maximum working efficiency with the lowest noise, with a power range of up to 5.5 and 15 HP, respectively, and a hydraulic efficiency of 78 to 85% (compliant with ISO 9906 standard).



Another option for freshwater lagoons is the Aral PLUS pump. This series is made of cast iron, and is specifically designed for large water installations while maintaining a low level of noise, featuring a 2 or 4-pole motor design that operates at 1.450 or 3000rpm, up to 12.5 or 25HP. The impeller is made of bronze, and all components in contact with water undergo a cataphoresis treatment, significantly extending the lifespan of the pump. This provides a robust barrier against corrosion and oxidation, ensuring durability and sustained performance over time.

Sena and Nautilus recirculation pumps





The Sena pump series is an ideal choice to guarantee proper water recirculation in freshwater lagoon installations with low to mid-flow needs. These compact single-speed pumps are easily installed due to their already-included fittings and easy-access electrical box, making them the perfect pump for even the smallest technical rooms. Available in single-phase and three-phase motors, Sena pumps can service from 3.5 to 16 m3/h.

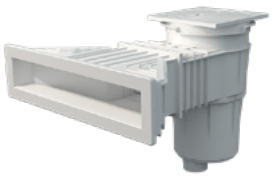
For saltwater lagoons, Nautilus Silent is the ideal AstralPool chemical-resistant pump. It combines outstanding performance and easy maintenance, all in one single-speed pump suitable for sea water and water with high levels of suspended solids and ozone treatments. Thanks to its hydraulic and motor designs, the Nautilus Silent provides an excellent flow and pressure output. Available in a wide range of powers for single-phase and three-phase motors, Nautilus Silent adapts to any lagoon size.

Norm Main Drains



With stainless steel grating for fresh water and ABS grating for salt water, the Norm Drain large-format floor drain is a highly efficient option for water drainage and circulation in artificial ponds. Its optimized design guarantees superior hydraulic management performance, preventing the accumulation of sediments and promoting better water oxygenation.

Large-format skimmers



To collect water from the sides and walls of the lagoon, the installation of large skimmers is recommended. They are designed to handle large volumes of water and efficiently capture leaves, debris, and floating particles. For a large artificial lagoon, installing several strategically-distributed skimmers is recommended, taking into consideration the direction of the wind and the internal currents of the water to maximise the efficiency of debris collection.

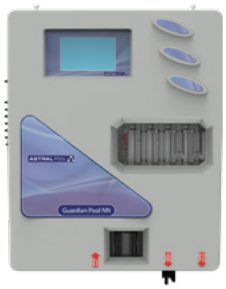
Neolysis or calcium hypochlorite and acid to adjust pH



Neolysis is a disinfection system that combines UV technology with low-salinity, low-environmental impact electrolysis, without added chemicals or chloramines. This reduces the need for water replenishment and offers significant energy savings. In addition, it reduces potential discomfort for bathers such as itchy eyes, breathing issues, skin irritation, strong chlorine smell, etc.

Another option is to dose calcium hypochlorite and acid to adjust the pH manually or dose directly into the treatment tanks to improve dispersion. The following Guardian Pool solution is an ideal choice to control the dosing of these chemicals.

Guardian Pool



The Guardian Pool unit is a great system to dose chemical products into treatment tanks for disinfection. It combines traditional control and dosing elements with total digital control of the values that facilitate water management. It also monitors installation history to analyze data and detect possible errors. Also includes an innovative design and 7" high-resolution touchscreen display and firmware updates viaUSB port, which is also used for downloading lagoon data.

Acqua Dos dosing pumps



The Acqua Dos digital dosing pump is a great choice for treating large volumes of water in an artificial lagoon. This model offers a maximum flow rate of 110 liters per hour and operates at a maximum pressure of 5 bar. Its pump head is made of PVDF, ensuring high chemical compatibility.

If your installation requires pH or ORP control, the Acqua Dos digital dosing pump with a built-in pH/ORP control meter is recommended. This model allows for constant or proportional dosing based on measured pH or ORP values and can interface with a PLC using the Modbus protocol. It is available in three models with different flow rates

Heliox UV automatic disinfection system





Heliox UV systems are designed to be used in public pools and lagoons. These lamps operate over the whole UV spectrum, which facilitates the effective eradication of chloramines (<0.6ppm)and efficient disinfection due to the neutralization of microorganisms (99.9%), including those resistant to chlorine treatment. The Heliox UV MP treatment system has a number of advantages over chemical disinfection systems, as UV light does not alter the physical or chemical composition of water, yet is very effective against any type of organism (algae, bacteria, viruses, fungi, yeasts, etc.). This further minimizes the risks of handling and dosing of hazardous chemicals. Moreover, UV treatment reduces the levels of combined chlorine in the water, thereby producing significant water and energy savings by reducing the volume and frequency of water replenishments.

Flocculation system



This system enhances water clarity by aggregating fine suspended particles into larger clumps (flocs), making them easier to remove via filtration or sedimentation. This system includes an adjustable pump (between 151 cm3/h and 1.5L/h), injector valve, bottom filter, and suction and return tube.



07 CONCLUSION

Thanks to their enabling the diversification of income sources, creating attractive features for end users, and elevating the nature of hotels, resorts, and condominium properties, artificial lakes and lagoons are ideal investments for long-term ROI. With careful planning and consideration, they can develop into large-scale structures attracting end users for bathing, sailing, water sports, and a range of other activities including water shows, commercial and retail, and more.

Fluidra's solutions allow operators and owners interested in designing and integrating a lake or lagoon on their property to rely on high-quality, durable options that will function optimally and offer ideal environments for guests. Through carefully selected tools and systems, Fluidra offers easy to manage, energy-saving maintenance and repair, as well as an attractive way to enhance your offering in real estate and hospitality.



"This information contains general recommendations that must be taken into consideration on a case-by-case basis. This information is not an instruction manual and cannot be considered as such for any purpose. Any implementation or installation to be made must be made by a professional and under the appropriate guidelines. In this regard, each user is responsible for the application it makes of the information contained herein. Fluidra will not be responsible for its use. Consequently, under no circumstances will Fluidra be liable or responsible for any claim, damages or loss that may arise as a consequence of the use of this information".



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