IOB

International Organization for
Natural Bathing Waters e. V.

www.iob-ev.com

The umbrella organization of natural swimming pool experts

Preface

Splashing fun and swimming are some of the most popular leisure and sporting activities around the globe. To ensure bathing and fun remain unclouded, the water must always be kept in a state to ensure healthy and safe conditions. As such, those goals need to be catered to: visual clarity, ground visibility, control of hazardous organisms and substances, as well as underwater obstructions. Purification of water takes place in technologically sophisticated processes. Nowadays, the most common procedure for controlling micro-organisms is chemical disinfection. Environmental impacts caused by this are numerous, including energy, water, chemical consumption, as well as chemical products resulting from these chemical additives (educts).

Nature, the role model of natural swimming pools (NSPs), does it differently: here, potentially harmful micro-organisms (pathogens) are consumed by competing microorganisms. These resulting waste products, in turn, provide nutrition for other life forms, like aquatic plants and biofilm, and are stored in biomass until removed from the facility.

As NSPs mimic and copy this natural water purification in pool- and pond-like appearances, they are considered nature-based solutions (NbS), as called for by the International Union for the Conservation of Nature (IUCN) and the EU Green Deal for a more sustainable world.

Thousands of private and hundreds of public facilities worldwide have proven how well biological water purification serves the above goals to operate NSPs long-term. Thousands of biological samples have been analyzed for water quality, and extensive research has been carried out. Improvements and innovations have been implemented, and a wealth of knowledge and experience has been gained.

The IOB e.V., as the global umbrella association, bundles the know-how of all members, who are specialists in planning and construction of biologically treated swimming facilities. For international quality assurance, all members agreed on ‘Common essentials for planning, construction, and maintenance of natural swimming pools and ponds (NSPs).’

With this brochure, you will receive insights into biological bathing waters, their variants, and the technological basis of biological treatment.

At the same time, this document aims to stimulate discussion and point out opportunities and possible optimization potential.

We wish you an interesting read and look forward to welcoming you as part of the growing network for private and public swimming by biological water purification.

Executive Board of IOB – International Organization for Natural Bathing Waters e.V., May 2025

Stefan Meier *President*
Maximilian Colditz *Vice President*
James Robyn *Second Vice President*

A Strong Association

Founded back in 2009, our organisation is pursuing the goal to expand knowledge in biological filtration processes to provide water for joyful bathing. Fourteen national associations have currently come together under the umbrella of the IOB. NSPs are now present in over 30 countries and represent hundreds of companies and individuals in the regulatory world, scientific research, and business of NSPs.

As a registered association (eingetragener Verein / e.V.), the IOB is set according to German law and managed by a board of directors who are elected by the general assembly every four years. Headquarters is located in Bremen (Germany). The five-member international board and its assessors are supervised in their work by the annual general assembly constituted by those national associations being regular members. In addition, a growing range of extraordinary members is given the opportunity to participate in the network while having the objective to build up another national association for an upcoming regular member.

Another major pillar in IOB’s worldwide-oriented work is coordination for planning of training and further education events. As the most important event, the International Congress for Natural Swimming Pools takes place every other year. Each summit is carried out by another national association, while conceptual sponsorship and organisation is always provided by the international organisation. As the core event for all interested groups worldwide, the event itself can look back on more than two decades of successful transfer and exchange of the latest experiences. In short: For designers and architects, engineers, installers, facility managers, and manufacturers, this event is the place to be.

The IOB also supports bachelor and master theses, doctorates, research assignments, and public processes related to legal regulations touching all areas of natural swimming pools. An in-depth analysis of efficacy and reliable hygienic performance of public NSPs over a period of 5 years is an example of the latest work efforts provided for the continuing success of members and future members.

Common Essentials for Natural Swimming Ponds (NSPs) – International Agreement

Since 2021, IOB members have agreed on common essentials for planning, building, and maintaining NSPs. This agreement was accepted during the IOB General Assembly on October 8, 2021, in Albufeira, Portugal.

Common essentials

Nature-Based Solutions: NSPs are nature-based solutions, engineered systems that use principles and processes known from nature.

1. **Circular economy:** The intention is that all materials used in NSPs construction should fulfill the requirements of Circular Economy. The goal of this is to eliminate waste and the continual consumption of resources. Circular systems employ reuse, sharing, repair, refurbishment, remanufacturing, and recycling to create a closed-loop system, minimizing the use of resource inputs and the creation of waste, pollution, and carbon emissions.
2. **Biological water purification:** To clarify and purify water, NSPs use only mechanical and biological methods to limit nutrients. Any further measures or interventions must primarily ensure these processes. Sustained harmful impacts from using biocides, chemical, or mechanical disinfection are not permitted.
3. **Professional Planning:** Each NSP is the result of a professional implementation of the customer's request and planning process based on scientific approaches and state-of-the-art technology. The resulting plan describes the water treatment process and predicts excellent bathing water quality. When the NSP is in operation, the planned water treatment process must meet the predictions and expectations on water quality.
4. **Customer Information:** Customers should be informed about all aspects of NSPs, including maintenance, especially with respect to what is to be expected in terms of living water quality and the presence of wildlife.
5. **Regulations Compliance:** Existing applicable building and construction regulations must be followed. This applies also to all safety regulations existing for swimming pools.
6. **Internal configuration:** An NSP is divided into a bathing area or areas, and treatment area or areas. Treatment areas are not accessible to bathers.
7. **Surface Water Runoff:** Surface water runoff from the property surrounding the NSP shall not flow into the NSP.
8. **Sealing:** An NSP must be sealed, that is, isolated from the ground under and around the NSP.
9. **Inoffensive Materials:** Materials used in NSPs should not pollute water or the environment. This also includes limiting the introduction of phosphorus.
10. **Native plants:** Autochthonous plants are preferred in an NSP. Plants deemed to be invasive species in the locale where the NSP is located are forbidden. Plants used in an NSP should be cultivated for that purpose and not be harvested from nature.
11. **Water composition:** All water used to fill the NSP must be analysed for physico-chemical composition before the first filling, and the result must be included in the planning process. Any water used to refill the NSP must be analysed for physico-chemical composition at appropriate and regular intervals.
12. **Water Testing:** Regular water testing with respect to hygienic and physico-chemical water quality is required by health officials for public NSPs and as needed for private NSPs.
13. **Indicator organisms:** For the assessment of water quality, the country-specific limit values are to be complied with. Otherwise, the indicator organisms recommended by the WHO for bathing water should be used.

Call for Implementation

The IOB General Assembly made these guidelines binding for affiliated associations, urging them to implement these guidelines in local regulations and ensure compliance in all projects.

NSPs – Natural Swimming Pools

Swimming and leisure in a pond-like environment or water activities in pools purified by biological and mechanical processes emerged over a reasonable period. Driven by a growing demand for such water bodies, various phenotypes developed to meet site conditions. It all started with the idea of home-owners swimming in their pond and possibly reflecting their childhood while having a swim with friends at a nearby pond or even in the heart of the village. Such facilities are artificial water bodies mimicking natural ponds while having no constant inflow or outflow from any part of the surrounding environment. Techniques in use for water purification in such basins rely on sedimentation, zooplankton, phytoplankton, and underwater plants to maintain low nutrient levels as an important base to maintain clear water.

Bathing experience and layout are characterised by rich flora and fauna around and inside these waters, abundantly flowering banks, and seasonal fluctuations in clarity of water due to possible algal blooms and their cyclical elimination by zooplankton. It is and remains a dream for enthusiasts of the most pure natural experience, loving to swim sometimes even eye to eye with frogs, dragonflies, and water lilies. In some countries, layouts for such water basins are referred to not only as NSPs but especially as natural swimming ponds.

Today, such layouts are sub-divided as follows:

Type 1: Strict natural water circulation by climate only and without artificial devices. Overall space requirement starts from 100 m² while approx. 2/3 serves as regeneration zone.
Type 2: Gentle water circulation and collection of debris from the surface is ensured using pumps and skimmers. While combining technical devices with a natural swimming pond, space requirement for regeneration zones can be lowered.
Type 3: Gentle overall water circulation feeding a designed filter for low flow-speed on the filter-medias' surfaces for fine particle removal and ensuring clear water but with the presence of brown sediments and algae-prone areas.

Long-term research has proven such filtration and water circulation models are particularly successful in ensuring the lowest concentrations of pathogenic microorganisms living in waters and meeting national limit values of health authorities. For this reason, at present, this type is the most used one in public NSPs overall.

As the notion of having a swim in water simply purified by techniques deriving from nature grew further, another phenotype of NSPs emerged. This enables users to avoid all common aggressive disinfectants, auxiliary chemicals, and the presence of life forms like frogs, insect larvae, and similar organisms. Overall, the visual appearance of such facilities is swimming-pool-like, and the purity of water as well as all submerged walls, stairs, and floor needs to show up the same neat look.

Here, natural role models are clean mountain streams where water flows over and through gravel banks where dissolved nutrients are fixed or processed at the biofilm. Such facilities require continuous circulation and regular maintenance to remove biofilm and sediments. Plants are mainly decorative and do not contribute significantly to nutrient binding. In most countries, the layout for such basins is referred to as natural swimming pool or biopool.

To date, the technical design is differentiated by the two types:

Type 4: Sound and full water circulation of the pool feeding an individually designed filter for fast flow-speed on the filter-medias' surfaces consisting of gravel.
Type 5: Sound and full water circulation of the pool feeding a pre-manufactured filter for fast flow-speed on the filter-medias' surfaces.

All NSPs rely on biological processes and beneficial micro-organisms to provide hygienically impeccable conditions. Any hazard to those must be ruled out from use inside NSPs. This applies for disinfecting agents, algaecides, as well as other active complexes.

The Introduction of the Public NSP to North America

In 2010, the city of Edmonton, Alberta, Canada was seeking contact to perform a Feasibility Study to determine if an existing chemically treated pool at the City's Borden Park could be converted into an NSP. A positive outcome meant that this NSP would be moving forward and it later became the 2nd Public Natural Swimming Pool in North America in 2018.

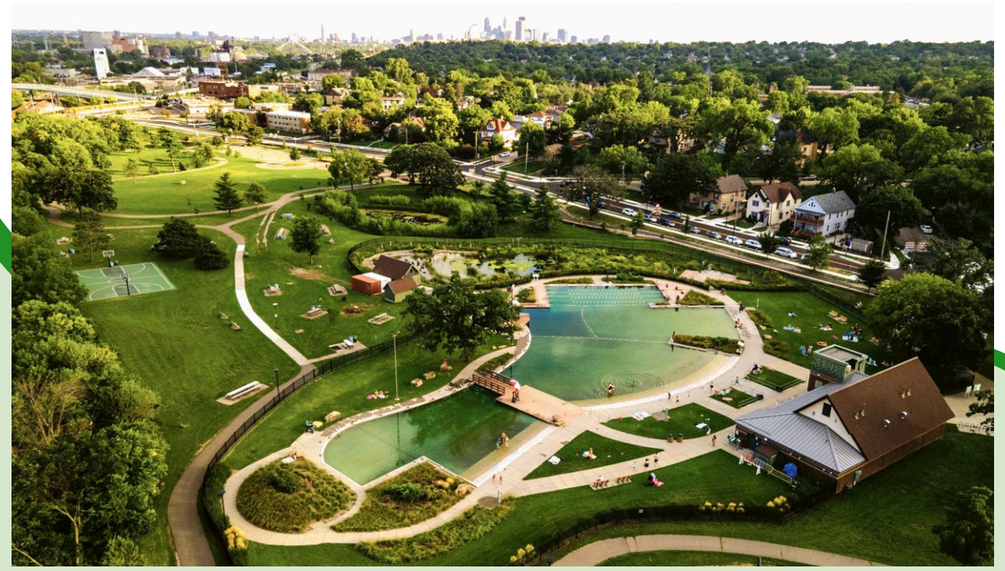
In 2012, the City of Minneapolis, Minnesota initiated the design and planning process to build a Public Natural Swimming Pool in Webber Park on the City's north side. This installation became the 1st Public Natural Pool in North America when it opened in 2015.

In the ensuing years, both of these installations have been very successful and are widely enjoyed by their communities. Many other municipalities and commercial entities have begun to look at the possibility of installing an NSP.

In 2013, a first-time opportunity was taken to present a 4-hour comprehensive overview of Natural Swimming Pools, both residential and public, at the World Aquatic Health Conference in Indianapolis. Attendees at the WAHC represented aquatic facilities and professionals from all over North America and around the world.

Unfortunately, too often local Health Department regulations require the use of a sanitizer in a public swimming pool, so in 2020, the Association for Swimming Ponds and Natural Swimming Pools (ASPNSP), which is the USA-based member organization of the IOB, filed a Change Request to the CDC's Model Aquatic Health Code to revise the MAHC to allow for the possibility of biological water treatment in a public swimming pool. Additionally, in 2024, a representative was accepted in membership of the Standard Writing Committee for the Pool and Hot Tub Alliance (PHTA) with the desire to implement the FLL guidelines for public natural swimming pools in the US.

With support from the IOB, the DANA database that tracks the chemical and biological parameters measured in public NSPs will make it easier to access efficacy data to support health department understanding of public NSP efficacy. The ASPNSP in North America has adopted the German FLL Guidelines to be the recommended standard for public NSP design, planning, and implementation in North America.



Keeping Natural Swimming Waters in Tip-Top Shape

Nature's always on the move –deep lakes turn into shallow puddles over thousands of years, rivers twist into new paths and leave behind oxbows that eventually clog up with mud. If you want to keep your natural bathing water just the way you like it, you've got to step in and lend a hand. Think of it like tending a garden – whether it's mowing the lawn or weeding flower beds, it takes regular TLC. How much effort you put in depends on what you're aiming for: a quick once-over now and then or a daily spruce-up.

Where Do the Nutrients Go?

When folks swim or the wind blows stuff in, nutrients pile up in these waters. They get trapped in sediment, plants, or biofilms, depending on how the pool's set up. But there's only so much room – eventually, you've got to clear them out.

- **Swimming Ponds with Large Planted Zones:** Plants soak up nutrients and stash them in their leaves, roots, stems, seeds, and vacuoles. You'll want to trim reeds before spring kicks off and snip underwater plants during peak growing time. Once a year, suck out the sediment with a special vacuum pump – pros usually handle this, no sweat.
- **Biopools with Biological Filters:** Here, the nutrients cozy up in the filter's biofilms. You clean these filters once or a few times a season – just rinse or backwash them, and use the nutrient-packed water to give your garden a boost.

In natural pools, biofilms coat everything, making surfaces slippery and sometimes funky-looking. They're key players in keeping the water clean, but they're a no-go at entry spots or kiddie zones for safety and appearance.

Keeping Things Fresh

- **Swimming Ponds with Large Planted Zones:** Focus on keeping walkways slip-free and scoop out debris from the swim area with a fine net every so often. It's all about that pond charm – maintenance here is more hands-on and thorough.
- **Biopools with Biological Filters:** People often expect these to sparkle like chlorinated pools, so regular biofilm cleanup is the norm – usually with automated pool robots. Smart design and materials can cut down on robot time big-time.

Balancing Nutrients

For all natural pools, getting the nutrient mix right is essential. You'll need to add minerals like nitrogen, magnesium, potassium, and trace elements to keep the good biology humming and prevent algae from taking over. There are natural products made just for this – no need for algae-killers or disinfectants – to keep your water crystal clear and happy.

Millennium Pool Gothenburg – Floating Pool with Fresh and Saltwater

As part of the redevelopment of the former free trade port in Gothenburg, Sweden, a master plan was developed for the city. One of the pilot projects was a floating pool with biological water treatment, planned in 2007. The pool was well-received by the public, leading to a decision to expand the project.

The initial pool was a steel structure with concrete floats and a biological water treatment system. Due to high demand, visitors had to book one-hour slots online. The pool's success (250-500 visitors per day) led to the planning and construction of a larger facility from 2021 to 2023.

The new pool taps into the Baltic Sea's saltwater beneath a freshwater lens. The pool's design allows saltwater to rise into the pool, providing a unique swimming experience with clear, clean water and typical saltwater biocenosis. Despite high contamination in surrounding surface water, the pool maintains low E. coli levels, meeting EU bathing water standards.

The pool's construction faced challenges, including dynamic salinity changes and extreme weather conditions. The structure was built with corrosion-resistant materials and requires annual inspections. The project was completed in winter 2023, with many construction firms contributing despite harsh conditions.

The pool's operation is monitored by an automatic sensor system, with data collected in the DANA 2.0 project cloud. The project is a unique model for future locations.

Advocating for Regulated Public Natural Swimming Pools in Commercial Installations Worldwide

Introduction

A recent study from DANA data, of over 20 commercial swimming pools, is perhaps the most significant contribution to the growth of Natural Swimming Pools (NSPs) worldwide. This paper leverages and evaluates years of data to demonstrate the efficacy of biological filtration and argue for the adoption of universal guidelines for the integration and regulation of NSPs in commercial installations, including public parks, camping grounds, and hotels.

Environmental Benefits

- **Sustainability:** NSPs operate without chemical disinfectants, relying instead on plants and natural filtration. This reduces chemical runoff, a significant environmental concern, and supports local biodiversity. NSPs provide a nature-based solution instead of an artificial chemically-based solution. NSPs also act as a carbon sink which adds to their usefulness and environmental benefits.
- **Energy Efficiency:** Data indicates that NSPs consume less energy due to the absence of extensive mechanical filtration systems, aligning with sustainability goals in public and commercial spaces.

Health and Safety

- **Chemical-Free Water:** The document underscores that NSPs can maintain water quality equivalent to or better than chemically treated pools, minimizing health risks from chemical exposure, particularly beneficial for vulnerable populations.
- **Safety Standards:** With proper regulation, NSPs can meet or exceed safety standards for public swimming areas. The document outlines successful international regulatory frameworks that could be adapted for U.S. use.

Economic and Social Advantages

- **Tourism and Recreation:** NSPs can enhance the appeal of commercial venues. Webber Park's NSP in Minneapolis, MN, USA, as well as hundreds of public/commercial NSPs in Europe, have not only become a local attraction but also a model for how such facilities can draw visitors, boosting local economies.
- **Educational Value:** NSPs serve as live demonstrations of ecological systems, offering educational opportunities about water conservation and ecology, which is particularly valuable in educational and public settings.

Case Study: Cooperation between the Austrian, German, Swiss Associations and IOB e.V. on a bioPool purified by a high-flow media surface

- **Objective**: Evaluates the effectiveness of biological fast filters for treating swimming pool water in high-usage public settings, challenging the adequacy of current FLL 2011 guidelines.
- **Focus Areas:** Examines microbial degradation rates, in-situ disinfection, and zooplankton's role in purification, aiming to optimize filter performance.
- **Study Site:** Conducted at Biobad Biberstein, Switzerland, providing real-world conditions for testing under controlled inoculation and bather load tracking.
- **Management & Budget:** Led by ASC Switzerland with international partners, funded at € 65K+, with findings slated for publication by May 2025.
- **Goal:** Seeks to update standards and boost biological filtration adoption in public and private pools, enhancing water treatment efficiency.

The study investigates the effectiveness of biologically active high-flow surfaces in treating swimming pool water, particularly in high-usage public settings. Current guidelines (FLL 2011) may underestimate the performance of these filters, prompting a need for updated standards. The research focuses on microbial degradation rates, in-situ disinfection, and the role of zooplankton in water purification. The study site, Biobad Biberstein in Switzerland, offers real-world conditions to test these variables. Methodologies include controlled inoculation, bather load tracking, zooplankton analysis, and filter performance optimization. The ultimate goal is to refine guidelines and enhance the use of biological filtration in public and private pools.

Regulatory Framework

- **Adaptation of FLL Standards:** The FLL standards from Europe could be customized, focusing on:
  - Water quality monitoring
  - Biological filtration systems
  - Operator training and certification
- **Economic Viability:** While initial setup might be costlier, long-term savings on chemicals and reduced energy use make NSPs economically attractive for commercial operations.

Conclusion

The data robustly supports the argument for integrating and regulating natural swimming pools in commercial installations. The success of Webber Park's NSP in Minneapolis, as well as hundreds of commercial/public NSPs in Europe, serves as compelling case studies, demonstrating that these facilities can be both safe and beneficial to communities. Regulatory bodies and commercial entities should consider these insights when planning to expand recreational water facilities.

Recommendation

Local and state governments should seek and adopt regulations that acknowledge biological filtration as a viable public swimming option. The IOB e.V. is available to participate in and consult with regulatory agencies in adapting these guidelines to ensure safety, environmental benefits, and economic advantage.

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Mail: office@iob-ev.com
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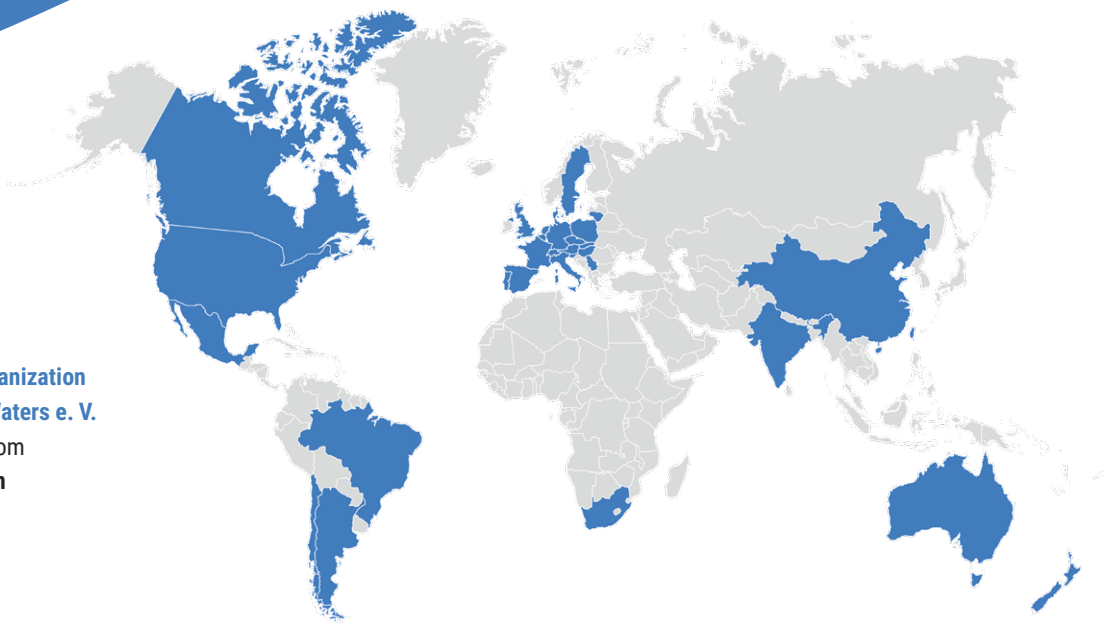

Associations

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Authors
Kubacek, *Franz* · ***Robyn,*** *James* · ***Meier,*** *Stefan*
Colditz, *Maximilian* · ***Bruns,*** *Stefan* · ***Schnaak,*** *Allen*
Schwarzer, *Claudia* · ***Becker,*** *Josef*

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