Pedagogical resources
AQUATIC ACTIVITIES

OPEN WATERS: WHAT ENVIRONMENTAL ASPECTS SHOULD BE CONSIDERED WHEN SWIMMING AT THE BEACH?

María Pedragosa Alberti

February 2, 2026

This work is licensed under a Creative Commons license. Commercial use of the original work or any derivative works is not permitted, distribution of which must be done under a license equal to that governing the original work.
Style Editor (English): Paula Albarracín López.

OPEN WATERS: WHAT ENVIRONMENTAL ASPECTS SHOULD BE CONSIDERED WHEN SWIMMING AT THE BEACH?

María Pedragosa Alberti

Guide to understanding and assessing the aquatic environment in open water swimming. Emphasizes planning, observation, and reassessment as key safety factors. Provides guidance on responsible decision-making to minimize risks at beaches.

Introduction

Open water swimming is a practice that, because it takes place in natural aquatic environments, presents challenges. Swimming as a sport that is taught and practised in pools involves the development of skills that, while useful in open water, are not sufficient, and it is in this sense that the concept of aquatic competence becomes relevant. This concept was originally presented by Moran (2013) as the set of aquatic safety skills and knowledge that seek to prevent drowning when facing natural environments. Subsequently, Fonseca-Pinto & Moreno-Murcia (2023) expanded the concept to include the set of knowledge, procedures, attitudes, and emotions that people need to solve problems or enjoy different aquatic environments, evolving from a perspective of "I know how to swim" to a concept of "this environment is swimmable for me." Open water swimming requires knowledge specific to that environment, situation analysis, emotional regulation, and decision-making skills. This decision-making involves assessing the levels of risk presented by the environment for each swimmer and determining whether it is appropriate to swim and how to do so at a given time and place.

From this perspective of aquatic competence, where understanding the dynamics of the environment, identifying hazards, assessing risks correctly, and making decisions are fundamental to drowning prevention, this paper seeks to provide guidance on which aspects or processes related to the environment should be considered when planning a beach swimming session to minimise risks. Prior to that, there is a presentation and brief analysis of some key terms.

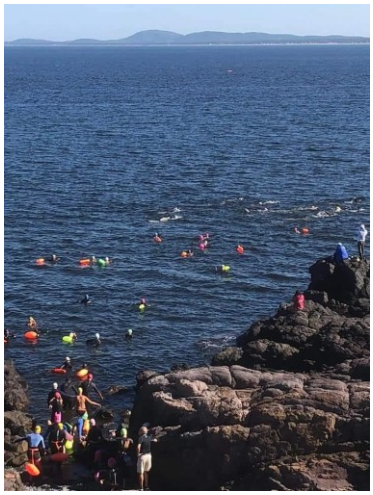
Open waters, bodies of water and aquatic environment

Open water (OW) swimming has experienced worldwide growth in recent years, although little has been documented about it. In several countries, such as Uruguay, the COVID-19 pandemic has been the driving force behind bringing more people to the sport, and many of them have permanently replaced the pool with open water (Pedragosa, 2022) (Figure 1).

Open waters

Open water presents other types of risks that we do not encounter in swimming pools. To define these risks, it is necessary to raise, though perhaps not resolve, the question of what exactly we mean by "open water". For example, Munatones (2011, p.2) defines swimming in open water in his book as follows: "...swimming for pleasure, exercise or competition in natural or artificial bodies of water including oceans, seas, estuaries, lakes, lagoons, bays, rivers, ponds, reservoirs, canals and dams". For its part, the International Swimming Federation (Fédération Internationale de Natation [FINA], 2022, p.2) defines OW swimming as any "competition that takes place in rivers, lakes, oceans or water channels except for 10 km events".

Figure 1. Swimmers in the Atlantic Ocean. Left: Swimmers in Punta Ballena – Maldonado (Uruguay). Right: Swimmers in La Aguada – Rocha (Uruguay). Source: Gabriel Grassi.



In these definitions, authors are forced to name every body of water that, according to their experience or subjectivity, falls into the category of "open waters". So, does any other body of water that could fall into the category of "open waters" and has not been included in these definitions fall outside the category?

This raises the question: what do we mean when we talk about open waters? Open to what, or in what sense? Does it refer to their direct exposure to meteorological phenomena? Does it refer to the variable extent and irregular edges of natural bodies of water? Does it refer exclusively to natural bodies of water, or does it include certain artificial bodies of water? What characteristics do all the bodies of water that we include in the category of "open water" have in common?

Bodies of water

Most would agree that natural bodies of water undoubtedly fall into the category of spaces where open water swimming takes place. However, these natural bodies of water must meet certain requirements for swimming to be possible, with "swimming" understood as "moving through the water, using the necessary movements, and without touching the ground or other support" (RAE, 2022). Among these requirements, the body of water must have a certain depth that allows for the lack of support and a surface area that allows for a certain minimum displacement. In addition, the body of water must be "open" to the atmosphere, so that it is accessible to anyone who wants to enter it, leaving out, for example, groundwater or bodies of water confined by rocks. Perhaps this last sentence provides a clue as to what we should understand by "open water", although a more in-depth debate is undoubtedly necessary. Beyond this, it is worth exploring how water is distributed and confined on our planet, forming the different bodies of water that are used in OW swimming.

The water on planet Earth, which forms part of various bodies of water, can be categorised as continental water or oceanic water. Continental water is, as the name suggests, found on the continents. Among them, lentic waters are those that do not flow (lakes, lagoons, ponds), while lotic waters are those that flow by gravity from higher to lower areas (rivers or streams). Oceanic waters are the large bodies of salt water that make up the oceans, the portions of which near the continents we call "seas".

These bodies of water have various characteristics that we must consider when swimming in them. First, there are the physical characteristics linked to their morphology and hydrodynamics (currents, waves, and tides), which, in turn, are modulated by atmospheric processes. Secondly, these spaces should not be considered a simple accumulation of water, but we must also observe that they are aquatic ecosystems where the living beings that inhabit them interact with each other, forming communities that, in turn, are linked to that physical environment. Finally, there is a third aspect to consider: these spaces are not immune to the global environmental crisis. The environmental consequences of the prevailing development model are also highly visible in natural bodies of water, which is why we cannot consider them as isolated spaces, but rather as directly influenced by their immediate (and not so immediate) surroundings. When considering these three aspects, the physical environment, living beings, and the impact of human action, our view expands beyond the physical "body of water", making it appropriate to use a more comprehensive term: "aquatic environment". This aquatic environment could be the "environment" referred to by Fonseca-Pinto & Moreno-Murcia (2023) in the contextualisation of aquatic competition, an environment that it is necessary to "know" to know how to "be" and "exist" in it.

Aquatic environment

To define the term aquatic environment precisely, it is necessary to introduce the concept of "environment". According to Achkar et al (2007), the environment no longer refers to the

space that surrounds us, but rather to a reality, in a given space and time, that depends on the relationship that society has with nature, that is, how it transforms it through socio-economic, cultural and political processes. For the Western development model, nature is a source of resources to be exploited and, at the same time, a sink for waste, with the result that environmental problems have been on the increase (Viale, 2018). Natural water bodies and their associated ecosystems are no strangers to this environmental reality. Therefore, in the context of open waters, we can define an "aquatic environment" as a "body of water and its surroundings, affected by meteorological, hydrological, hydrodynamic, geomorphological and ecological processes, but also socio-economic, technological, political and cultural processes". To simplify this idea, consider a river, for example, which naturally has certain characteristics in terms of shape, flow and community of living beings. That river will not be the same if its environment is a space that has not yet been invaded by humans, or where indigenous communities live on its banks, compared to a situation where the river flows near urban and industrialised areas where it is a source of water for the population and a sink for wastewater, or where the river has been modified by dams or the stiffening of its banks. In other words, the way society views nature (including the river) and makes use of it has an impact on the environmental reality of that river. Added to this are the modifications that occur through natural processes such as meteorological and hydrological events. All these aspects influence the practice of OW swimming.

What environmental aspects should swimmers or open water instructors consider when planning a swimming session?

Considering what has been discussed so far, it is necessary to ask what environmental aspects swimmers or open water instructors should consider when planning a swimming session. Although each particular aquatic environment will have its own distinctive characteristics, there are aspects that are common to all of them. These aspects can be summarised in the three characteristics defined above:

- Water body dynamics: these depend on physical processes that act as agents of change (meteorological, hydrological, hydrodynamic processes such as waves, currents and tides, and geomorphological processes).
- Living beings: the presence of certain living beings may pose a risk of injury (e.g. jellyfish, sharks, certain types of fish). In turn, we must consider how our practice affects the community or certain species, seeking to avoid harmful impacts.
- Aspects derived from the development model: water pollution, noise pollution, air pollution, constructions that modify the body of water and may pose hazards (dams, breakwaters, ports, jetties, piers), naval traffic, nautical devices, access to the body of water, etc.

Among the different aquatic environments, beaches are spaces that have become public recreation areas par excellence, where various recreational and sporting water activities take place, including open water swimming. As a coastal environment, it is characterised by being an area where the sea, the atmosphere and the land meet in such a way that their interactions constantly shape it. The influence of atmospheric processes, particularly wind, on these spaces generates waves and currents, compounded by the effect of the tides. The community of living beings that inhabit this area is very diverse, and most species depend on both the mainland and the open sea, although there are also strictly marine and strictly terrestrial living beings. In turn, the coast is an increasingly populated area, which makes it an aquatic environment affected and modified because of socio-economic, cultural, political and technological processes (e.g. water pollution or lack thereof, presence or absence of lifeguard services, constructions that affect dynamics, access stairs or lack thereof, presence of boats, etc.). All these aspects must be considered when planning a swimming session at a beach, within a safety framework. Below are the steps for planning a swimming session, considering all the particularities of this specific environment.

The beach as an aquatic environment for practice: planning stages

Given the increasing use of beaches as a place for swimming and considering the particular dangers they may present, a three-stage planning process is proposed here, taking into account all the aspects mentioned above. These stages are: 1) foresight (before leaving); 2) observation (upon arrival, before swimming); and 3) reassessment (during the swim itself). These stages are applicable to any body of water in which one wishes to swim, but here we will delve deeper into each of them in the context of the beach.

Forecasting (before leaving). This stage involves assessing the conditions of the beach where you want to swim before arriving at the location. It allows you to decide whether or not it is advisable to go to a particular place based on the forecasts. Three main aspects should be considered: the characteristics of the area where you will be swimming, the weather conditions and the astronomical tide.

- **Practice location:** Identify the swimming location you want to go to, analysing its geomorphological characteristics, accessibility, water quality, among other aspects. In

other words, there are certain questions we must ask ourselves, which are detailed in Table 1.

- **Weather conditions:** Dangerous events such as storms, cold fronts, or heavy rain must be ruled out. If there are events of this type, you should not go swimming, but if there are none, the wind direction and intensity should be analysed. This is essential because, depending on the orientation of the beach, it determines whether there will be an onshore or offshore wind. An onshore wind is ideal in the sense that, behind the usual breakers, it does not generate waves, which makes swimming easier. The downside is that it can push us inland if it is very strong and can lower the tide significantly, exposing rocks. Sea winds, on the other hand, generate small waves at speeds of 15 km/h or more, which can be annoying. The upside is that they tend to push us outwards and raise the tide (Figure 2). Finally, sea or land winds do not necessarily blow perpendicular to the coastline, which means that they also generate lateral currents behind the breakers that we can predict by knowing their direction.
- **Astronomical tide**: Tide tables should be consulted to determine the sea level due to the astronomical tide, which overlaps with the wind tide. In areas with high tidal ranges, it is important to consult the sea level and the intensity of the associated tidal currents. The latter are particularly important when crossing straits or heading towards islands and islets, as they reach higher speeds in these areas than in beach areas.

Table 1. Questions we should ask in relation to the particular space of practice.

	Guiding questions
What shape is the beach?	Bay: More protected from wind and waves. Straight and open: More exposed to wind and waves.
Is it a rocky beach?	Submerged rocks are dangerous and often found on the shore, making it difficult to enter or exit at low tide.
Is it a beach with cliffs or ravines?	There may be no beach space left when the tide rises.
How is the beach oriented?	Knowing which cardinal point it "faces" allows you to assess how the winds will affect it.
How wide is the surf zone (where the waves break)?	A very wide surf zone with high-energy waves can be very difficult to cross, causing fatigue before you even start swimming. If it is very wide, we will rule out that location.
If the idea is to swim to an island or islet, or cross a bay, what is the distance between the starting and finishing points?	The distance to choose depends on the physical condition of the swimmers and the sea conditions. When making these crossings, there is no quick escape to dry land (a boat should accompany you to facilitate your exit)
Is there a lifeguard service?	If not, it is recommended not to swim.
Is it a well-known location?	It is recommended to swim in well-known locations or, if exploring a new location, to do so accompanied by someone familiar with the area beyond the lifeguard stations.
Are there storm drains or collectors that could be affecting water quality?	If so, avoid swimming in that location.
Are there piers, breakwaters or other structures that we need to avoid?	These structures can be dangerous in times of heavy swell or strong currents that could pull swimmers towards them.
Is the location easily accessible?	Easy access is advisable in case of medical emergencies or if the area needs to be evacuated quickly due to changing weather and/or sea conditions.
What is the water temperature at this location?	Depending on this, we will decide whether to wear a wetsuit or not, as well as how long to stay in the water.

Figure 2. Differences between low and high tides. Left: Low tide. Right: High tide, note the submerged breakwater.

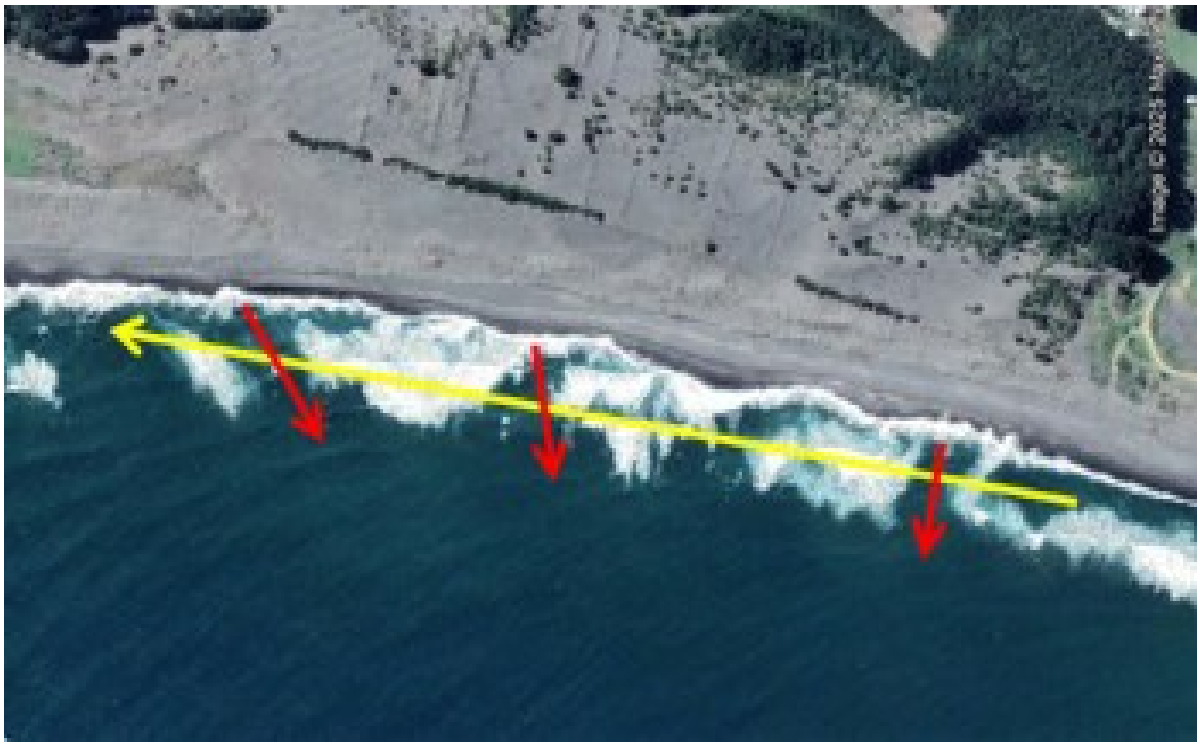
After analysing the above aspects, a decision will be made as to whether the location is suitable for the desired time or whether the location or time needs to be changed. This is the first opportunity to decide whether to go ahead with swimming, based on the premise of seeking a safe practice where risks are minimised.

Observation and design of the swimming strategy (at the location). Once the decision has been made in the previous step to move forward with the plan, and the where and when of the swim have been defined, upon arrival at the location, it is necessary to verify whether the wave, current, and tide forecasts match expectations or not, and if necessary, modify the plan. In addition, it is important to observe aspects that cannot be predicted or are not easily predictable, such as the following:

- Side currents within the surf zone: sometimes visible to the naked eye, but other times you must enter the water to assess their intensity and direction (Figure 3).
- Rip currents: these can be used to your advantage to enter the water if you are an experienced swimmer. However, they can be dangerous when exiting if we do not realise that we are in one and continue swimming against the current (Figure 3).
- Wave break pattern: observe how the waves break to plan your passage through the surf zone, or, if they appear very dangerous, you may need to abandon your plan.
- Specific hazards: hazards such as submerged rocks, breakwaters, sunken buoys, shipwrecks, unexpected sewage drains, etc. are identified.
- Living creatures: the presence of living creatures is a fact, and here we must consider that they are in their habitat, and we are the visitors. We must decide whether we are willing to share the space with the risks involved in each case or not. Here we could mention jellyfish, sharks, cetaceans (whales and dolphins) or pinnipeds (sea lions, seals, etc.), which are living beings that may eventually cause fear when encountered, although not all of them represent risks or the levels of risk they pose are variable. We could also include here algal blooms, which are triggered by a combination of factors, including those derived from the development model, or the presence of coliforms or other types of pathogenic bacteria.

- Landmarks: useful landmarks are chosen during swimming depending on the direction of travel. These landmarks can be buildings or antennas on land or buoys in the water.

Figure 3. Lateral current (yellow arrow), return currents (red arrows).
Source: Google Earth.



This observation stage gives us a second opportunity to make decisions, allowing us to modify or abort the plan if risks are detected. After considering all the above points, we define the safe entry and exit points, the distance and the direction of the swim, thus developing the swimming strategy.

Re-evaluation. Once we start swimming, we have a third opportunity to make decisions because we will be constantly assessing the conditions and how we feel. Although during the planning stage we must rule out sudden changes in wind direction or intensity, during the swim, unforeseen events may occur that we will have to deal with. In any of these situations, we will have to resolve issues such as the need to shorten distances, change the direction of swimming, change the starting point or leave immediately. These include the following:

- **Changes in wind direction or intensity**, waves and currents: it may be necessary to get out of the water if conditions become intense, or simply change the direction you are swimming in, or shorten the distance depending on the situation.
- **Approaching permanent hazards** such as rocks or breakwaters: ideally, you should get out of the water before you get close to them, but if the current is carrying you quickly towards them, it may be necessary to go around them from behind.
- **Appearance of potentially harmful living creatures**: get out of the water.

- **Symptoms of hypothermia**: get out of the water.
- **Excessive fatigue** or the onset of any physical impediment (e.g. cramps, dizziness): get out of the water.
- **Loss of equipment**: it may or may not be necessary to get out of the water, depending on what item is lost and the sea conditions. Losing your buoy in rough seas may be a reason to get out. Losing a fin (or flipper) is not always a reason to get out; it depends on the individual. Sometimes it is enough to shorten the distance or change the route.
- **Need to help another person**: if someone feels unwell, this is a reason to stop. If there are lifeguards, you can raise your hand (the international signal for help) and ask for assistance in getting out. If there are no lifeguards, accompany the person out, but try to get them to move under their own power. Using your body to tow someone when you are not prepared can be risky, hence the importance of going to supervised areas.

Conclusion

The natural aquatic environment must be assessed in an orderly and careful manner to reduce the risks of drowning or negative experiences when swimming in open water. This study proposes a way of planning beach swimming sessions in three stages, each of which requires careful assessment, always prioritising the swimmer's safety. The three stages represent three opportunities to make decisions that reduce risks, starting with planning before going to the location. Each beach is very different from another, so the questions to ask at each stage or the aspects to consider may be slightly different between them. In turn, each beach can change its dynamics in a matter of minutes, so we must be prepared to change decisions while swimming.

This proposal is intended as an initial guide to help organise the environmental aspects to consider when swimming at beaches if what we are looking for is to practise in a safe environment that allows us to enjoy ourselves to the full.

References

Achkar, M., Domínguez, A., & Pesce, F. (2007). *Educación, ambiente, sustentabilidad: Una tríada forjada a lo largo de tres décadas*. Redes Amigos de la Tierra.

Federación Uruguaya de Natación (2022a). *Campeonato Aguas Abiertas 2022*. https://www.federacionuruguayanatacion.org

Fonseca-Pinto, R. F., & Moreno-Murcia, J. A. (2023). Towards a globalised vision of aquatic competence. *International Journal of Aquatic Research and Education, 14*(1), Article 11. https://doi.org/10.25035/ijare.14.01.11

Moran, K. (2013). *Defining "Swim and Survive" in the context of New Zealand drowning prevention strategies: A discussion paper*. WaterSafe Auckland.

Munatones, S. (2011). *Open water swimming*. Human Kinetics.

Pedragosa, M. (2022). Nado en aguas abiertas en Uruguay: Análisis del fenómeno de expansión de la práctica tras la pandemia por COVID-19. *Revista de Investigación en*

Actividades Acuáticas, 6(12), 60-66.

Real Academia Española. (2022). *Nadar*. En *Diccionario de la lengua española*. https://dle.rae.es/nadar

Viale, E. (2018). Conferencia central: Visión regional del desarrollo, derechos humanos, ambientales y de la naturaleza. En *Derechos humanos y ambiente* (pp. 27-40). RETEMA, Universidad de la República.