

IOC Guide on Sport, Environment and Sustainable Development

4.3. Water sports in the natural environment

4.3.1 General

Sailing, rowing and canoe-kayak are the outdoor sports on water, whether the sea, artificial or natural lakes or rivers. They are aquatic navigation sports, which are dependent on nature and the quality of the aquatic environment but also, for sailing, on one of the key climate factors: the wind.

This factor is the result of the major air circulation currents in the troposphere (the first 18 km of air above the surface of the globe). In the northern hemisphere, these currents produce prevailing east, or trade winds between the equator and around 30° north, while between 30° and 60° north, the prevailing wind is from the west, and further north the polar east winds predominate.

The geographical conditions, particularly the relief, and local climate phenomena transform the direction and strength of these main currents. In addition, near coasts, the differences in temperature between the land and the sea give rise to temporary local winds (morning and afternoon) known as thermal breezes. These are much appreciated for sailing competitions, as they provide a good wind strength but without making big waves.

Some facts

- In the northern hemisphere, a south wind generally means bad weather to come, while good weather is preceded by a north wind. The opposite is true in the southern hemisphere.
- A period of regular and sustained wind which pushes water towards the shore where it is blowing may create minor (aeolian) tides in lakes.
- Building along shores (houses, roads, etc.) reduces thermal breezes. The more built-up the coast, the fewer sailing possibilities it offers in terms of thermal breezes.
- On a sailing boat, the wind is generally stronger at the top of the mast than at cockpit level.
- A sailing boat's speed can be defined on the basis of three parameters:
 - in relation to the bottom of the water (true speed),
 - in relation to the surface of the water (surface speed)
 - in relation to the wind (apparent speed)

As with all other water sports, the quality of the water is important in sailing.

There are several reasons for this:

- A clean lake, river or sea offer pleasanter sailing conditions (water transparency, lack of smells, lack of objects which might stick to the hull, oars or paddles, etc.);
- Sailors sometimes swallow water (waves, spray, falling in, etc.), and if this is polluted it may cause illness. Unfortunately, rivers, lakes and seas are increasingly polluted.



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Figure 33: Windsurfers are very much exposed to the risks of polluted water.

Rivers are polluted by:

- Untreated human, animal, household and industrial sewage and waste which go into rivers, meaning that the process of breaking this down in the water consumes the oxygen which aquatic plants and animals need to live;
- Run-off water in towns and countryside which is not absorbed by plants or trees on the banks;
- Hydrocarbons and other emissions from river traffic;
- Mining activities on river banks;
- Building on the banks.

Lakes are polluted by:

- The same factors as for rivers, with greater effects as the water does not move or moves only slowly, and so has less power to clean itself;
- Phosphorus or nitrates (from detergents, fertiliser, etc.) which cause algae to grow to the detriment of other aquatic organisms (a phenomenon known as eutrophication);
- Acid rain, which prevents the growth of photosynthetic algae and their oxygenation of the water;
- Antifouling paint, which protects the hulls of boats (see following chapter);
- The arrival of exotic species (for example, the zebra mussel, *Dreissena Polymorpha* in European lakes or Nile perch, *Lates Niloticus*, in the lakes of Central Africa) which compete with the indigenous species;
- Overfishing, which reduces biodiversity.

The sea is polluted by:

- Untreated household and industrial sewage pumped into the sea from coastal regions and towns;
- Pollution transported by rivers;
- Rubbish from leisure boats and cruise ships, particularly plastic bags which suffocate aquatic mammals;
- Antifouling paint, which protects the hulls of boats (see following chapter);
- Chemical products (chiefly hydrocarbons) from maritime traffic and accidents;
- The arrival of exotic species (for example "killer algae" *culerpa taxifolia* in the Mediterranean) which compete with native species;

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- Overfishing, which reduces biodiversity;
- The disappearance of coral due to global warming and pollution;
- The disappearance of mangroves due to tourism development and the creation of prawn farms.

Some facts

- 70% of the world's coral is in danger.
- Each year, six million tons of petroleum products end up in the sea. Only 2.5% of this is due to accidents (between 115 and 120 big ships are wrecked each year), while 25% is due to oil tankers illegally flushing out their tanks or jettisoning ballast.
- Two-thirds of maritime pollution comes from the earth, either from the atmosphere or from rivers.
- Each year, almost 2.5 million cases of infectious hepatitis are caused by eating polluted shellfish, resulting in around 25,000 deaths and 25,000 cases of long-term disability.
- By 2020, 80% of the world's population will be living on a coastal strip 60 km wide, representing just 15% of the land surface.
- Each year, some 85 million tons of fish are taken from the sea. This figure has remained stable for 20 years. With overfishing comes poor exploitation: of these 85 million tons, between 20 and 30 million tons of fish are thrown back into the sea or killed on the seabed.

Easily-identifiable characteristics of a healthy aquatic environment

- Transparency to a depth of 8 to 10 metres (except for water which is naturally silty or full of organic matter, for example the Amazon);
- An absence of floating objects;
- A lack of foam or oil slicks;
- No unpleasant smells;
- The presence, but not a proliferation, of seaweed;
- The presence of species sensitive to pollution (salmon, dolphins or whales).



Figure 34: Transparent water and seaweed are two of the signs of a healthy aquatic environment.



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4.3.2 Sailing

4.3.2.1 General

Practised with a few simple rules of conduct vis-à-vis the environment (see previous paragraph), sports sailing per se has no negative impact on the natural environment:

- It causes no physical damage to the environment (the hull moving through the water causes no change to the physical nature of the water, unlike what can happen to the soil, which is compacted and denuded when people or vehicles pass over it);
- It produces no solid, liquid or gaseous waste products, nor pollutants (except if anti-fouling paint is used: see below);
- It consumes no resources from the natural environment.

4.3.2.2 Environment-friendly sailing

When sailing, cruising or taking part in regattas, sailors can help to protect the aquatic environment by respecting a few simple-to-follow rules.

Rules of conduct for preserving the quality of the aquatic environment

- Never throw plastic bags, oil or diesel, chemical products (detergents, washing powder, bleach, solvents, etc.), fruit or vegetable peelings (these are difficult to biodegrade) or solid household waste into the water;
- Never pour waste water (toilets or sinks) or food remains into rivers, lakes, ports or closed bays less than three nautical miles from the coast;
- Carefully clean your anchor after each mooring to avoid spreading exotic species;
- Carefully maintain your engine to avoid oil and petrol leaks when it is in operation;
- Use outboard motors as little as possible;
- Do not use tributyltin (TBT)-based anti-fouling paint;
- Do not drop anchor on coral reefs or seagrass (posidonia) fields;
- Avoid going too close to aquatic bird nesting sites on the shoreline.

4.3.2.3 Impact of sailing events and port facilities

Sailing boats in regattas do not normally have an impact on the environment. However, during regattas, the presence of boats used by the organisers or people following or watching the race, which are generally motor boats, can cause pollution (loss of fuel or oil, exhaust and noise), churn up the water damaging aquatic plants on the shore or animals living there, and use non-renewable energy.

Sailing requires the creation of shelters or ports. To minimise the impact of these on the natural environment, the following rules need to be respected:

Responsibility of those in charge of clubs and regattas

- Do not create a port on a shore of particular environmental interest: reed beds, nesting sites, mangroves or coral, for example;
- Collect and treat waste water from the club premises and careening areas;
- Provide enough dustbins, rubbish containers and containers for used oil, so that this can be taken to the appropriate handling centres;
- Clearly inform users of the environmental protection rules to be respected, and possibly have a system of fines;

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- During regattas, it is necessary to limit the presence of motor boats on the water (particularly individual boats) as much as possible and impose strict limits on their speed.

4.3.2.4 Special waste, toxic products and pollutants linked to sailing

Antifouling paint, and the construction and elimination of old glass fibre boat hulls are the two main sources of toxic pollutants and waste linked to sports sailing.

a) Antifouling paint

This is intended to protect the part of the boat which is in the water from being covered in weed, shells or any other type of marine organism. It is composed of a product which is toxic to these organisms and is incorporated into a polymer. The polymer gradually releases the active product into the water, creating an environment around the hull of the boat which is toxic to any organisms which might stick to it. The toxic product is often composed of two active agents, one of which is copper. For a long time, the other active agent was an organic tin composite: tributyltin (TBT). But TBT has proved to be extremely toxic to all molluscs, particularly mussels and oysters.

TBT-based antifouling paints are now banned in many countries, so they should never be used. In many cases (boats stored on land when they are not being used, or freshwater sailing), antifouling paint is not necessary. For the others, use non-polluting antifouling paint with a mechanical effect (the paint is so smooth that nothing can stick to it) or others made with an organic pesticide ("triazine") which creates less pollution.



Figure 35: Antifouling paint is useful only for boats which are always in the water.

b) Construction and elimination of boats

Most sports sailing boats are made of polyester-coated glass fibre. Building these can give off products which are highly toxic for the people working with them. You should therefore buy only boats which have been built at shipyards which observe strict health and safety standards.



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The material used for the hulls breaks down only very slowly. An abandoned boat hull will therefore become a wreck which is likely to be an eyesore and pollute the landscape for a long time. The same is true of carbon masts and sails made of synthetic fibres.

The aim should therefore be:

- To delay as long as possible the time when a boat becomes a wreck: a high-level competition boat can subsequently be used for many years for leisure sailing;
- Never get rid of old hulls by sinking them at sea;
- Never throw away old hulls, masts or sails in the natural environment;
- Have old hulls, masts and sails recycled or destroyed by professionals, or take them to supervised waste disposal sites.

The possible methods for recycling polyester boats are as follows:

- Incineration. Old hulls are burnt and the heat used, for example, in cement works;
- Shredding. Shredded hulls produce material which can be used as an inert additive, for example in road surfaces;
- Pyrolysis. Heat is used to decompose the polyester of hulls to produce heavy oils which can be used as fuel in boilers.

Boats or sections made of steel and aluminium can be recycled and the metal used again.

4.3.2.5 Other aspects of sports sailing linked to sustainable development

Sailing is a very good means of raising awareness of nature and the great forces which govern it. Sailing involves a dialogue with the forces of nature, and a good sailor is in close communion with two natural elements: the sea (waves and currents) and the wind. Learning the scale of the forces of nature through sailing is an excellent way of raising environmental awareness. This can start at a very young age using boats suitable for small children.

Sailing is also easily adaptable to people with disabilities. In particular, there are boats which allow people without the use of their legs to sail or take part in regattas.

Sailing in a crew is also an excellent way of improving social skills and teaching a sense of responsibility among people with social or emotional problems.

Sailing is also a sport which forms part of the brotherhood and solidarity of sea-going people. The amateur sailor who



Figure 36: Learning to sail is also a way of making children aware of the environment.

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takes his boat out for pleasure has to respect the professionals of the sea. They must never be hindered in their activities, and all sailors must know and respect the signals and instructions which govern their activity at sea. At the same time, any sailor in difficulty can count on their solidarity.

4.3.3 Rowing

4.3.3.1 General

It is possible to row without any negative impact on the natural environment. As with other navigation sports, it does no physical damage to the environment and produces no solid, liquid or gaseous waste or pollutants, and uses no resources from the environment.

4.3.3.2 An environment-friendly approach to rowing

Rowers can help to protect the aquatic environment by respecting a few easy-to-follow rules.

Rules of conduct for preserving the quality of the aquatic environment

- Do not throw plastic bags, cigarettes, leftover food or any other solid or liquid waste into the water;
- When maintaining boats, never pour chemical products (lacquer, varnish or paint) into the water or any other rubbish resulting from such maintenance;
- Near banks, avoid going too close to aquatic bird nesting sites.

4.3.3.3 Impact of rowing events and the necessary facilities

Rowing competitions require the preparation of lakes as well as buildings to maintain and store boats. In addition, during competitions, the presence of spectators on the banks can lead to damage to the flora and fauna of these banks. To minimise the impact of the facilities needed and the presence of spectators in the natural environment, the following rules should be respected:

Responsibility of those involved in rowing competitions

- When preparing lakes for rowing, pay particular attention to the following:
 - Ensure there is vegetation on the banks for aesthetic reasons, and to create a natural barrier to avoid contamination from run-off water and reduce the impact of waves. At the same time, ensure that such planting does not create different conditions for the different competition lanes;
 - Although currents should be avoided for competitions, in artificial rowing lakes there should be a system to allow the water to be renewed when events are not taking place;
 - Avoid contaminating the water with waste water.
- The paint on blades, sponsor identification marks and any other application on hulls, as well as the buoys and markers used for competition and the paint on these, must not contain any products which cause pollution (heavy metals, organotins or organochlorides);
- Do not site landing stages or boathouses on banks of particular environmental interest, such as reed beds, nesting sites, mangroves or coral;
- Collect and treat waste water from club buildings and boat maintenance areas;
- Promote and provide a convenient public transport system for travelling to the event;
- During competitions, provide the public with enough rubbish bins so that the contents of these can be taken to the appropriate treatment centres;
- Provide clear information for users on the environmental protection rules to be respected, and possibly put in place a system of fines.



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4.3.3.4 Special waste, toxic products and pollutants linked to rowing

Certain paints, and the maintenance and elimination of boat hulls are the main source of pollution, toxic products and waste linked to rowing.

a) Paints

When decorating blades, boats, buoys and markers, avoid using paints containing lead, copper, cadmium, tin, organochlorides (PCBs) or pesticides.

b) Maintenance and disposal of boats

The hulls of competition boats are usually made of composites (Kevlar®, carbon fibre or glass fibre). The way these are built can give off products which are highly toxic for the people working with them. You should therefore buy only boats which have been built at shipyards which observe strict health and safety standards. These materials break down only slowly. An abandoned boat hull will therefore become a wreck which is likely to be an eyesore and pollute the landscape for a long time. The same is true of the accessories: rowlocks, seats, etc.

You should therefore:

- Delay as long as possible the time when a boat becomes a wreck: a high-level competition boat can subsequently be used for many years for teaching and training;
- Never get rid of old hulls by sinking them;
- Never dump old hulls in the natural environment;
- Never burn old hulls made of composites, as this could produce toxic smoke;
- Have old hulls and accessories recycled or destroyed by professionals, or take them to supervised waste disposal sites.

The possible methods for recycling rowing boat hulls are the same as for sailing boats: incineration, shredding and pyrolysis. For wooden boats, simple incineration or chopping up for burning are feasible.

4.3.3.5 Other aspects of rowing linked to sustainable development

Rowing is a sport which can be practised irrespective of age, sex or ability. As such, rowing clubs are ideal places for meetings, exchanges and understanding between generations and for integrating people with disabilities. Most rowing disciplines are for teams, which generates a particularly strong sense of discipline and collective solidarity.



Figure 37: Rowing teaches discipline and collective solidarity.

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4.3.4 Canoe-kayak

4.3.4.1 General

Canoe-kayak is a sport practised at sea or on natural or artificial lakes or watercourses which reproduce the current and eddies of a mountain stream. The quality of a natural lake or watercourse therefore depends largely on the general quality of the local environment. Canoe-kayak can be practised with no impact on the natural environment, provided the facilities needed to hold the events do not alter the conditions of the lake or watercourse and its banks, and provided the public respects the site of the competitions.

Some facts

- The quality of a watercourse depends directly on five main factors: what is discharged into it, the nature of its banks, its transparency, its temperature and its geography. These factors determine the oxygen concentration and biodiversity of a watercourse, the two elements which control its ability to clean itself.
- The discharges into a watercourse are waste water, which should be treated, and runoff from roads and fields which is impossible to treat, but whose impact it is possible to reduce by a good level of vegetation on the banks.
- The water needs to be transparent for photosynthesis which, together with mixing of the water, ensure its oxygenation.
- The lower the water temperature, the higher its oxygen concentration. For small watercourses, the shade of trees on the banks stops the sun from heating the water too much and thus maintains the oxygen in the water needed for the self-cleaning process, even during hot weather.
- The geographical diversity of a watercourse (meanders, islands, etc.) ensures the presence of a wide variety of species and thus the biological richness which increases its self-cleaning capacity.

4.3.4.2 An environment-friendly approach to canoe-kayak

Those who practise canoe-kayak can help to protect the aquatic environment by respecting a few easy-to-follow rules.

Rules of conduct for preserving the quality of the aquatic environment

- Do not throw plastic bags, cigarettes, leftover food or any other solid or liquid waste into the water;
- When maintaining canoes and kayaks, never pour chemical products into the water or any other rubbish resulting from such maintenance;
- Avoid practising canoe-kayak in environmentally sensitive areas, especially near to aquatic bird nesting sites.

4.3.4.3 Impact of canoe-kayak events and the necessary facilities

Canoe-kayak competitions require the alteration of natural lakes and watercourses, as well as buildings to maintain and store the boats. In addition, during competitions, the presence of spectators on the banks can lead to damage to the flora and fauna of these banks. To minimise the impact of the facilities needed and the presence of spectators in the natural environment, the following rules should be respected:

Responsibility of those involved in canoe-kayak competitions

- When choosing watercourses or lakes, opt for sites of lower environmental importance where spectators will not damage the banks;
- The paint on blades, sponsor identification marks and any other application on hulls, as well as the buoys and



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markers used for competition and the paint on these, must not contain any products which cause pollution (heavy metals, organotins or organochlorides);

- After competitions, remove buoys and markers and return the site to its natural state;
- Do not site landing stages or boathouses on banks of particular environmental interest, such as reed beds, nesting sites, mangroves or coral;
- Collect and treat waste water from club buildings and canoe maintenance areas;
- Promote and provide a convenient public transport system for travelling to the event;
- Direct spectators towards banks with less vegetation, and possibly protect banks against being walked on and provide the public with enough rubbish bins so that the contents of these can be taken to the appropriate treatment centres;
- Provide clear information for users on the environmental protection rules to be respected, and possibly put in place a system of fines.



Figure 38: An example of a canoe-kayak event in a natural well-protected site.

4.3.4.4 Special waste, toxic products and pollutants linked to canoe-kayak

Certain paints, and the maintenance and elimination of boat hulls are the main source of pollution, toxic products and waste linked to canoe-kayak.

a) Paints

When decorating blades, boats, buoys and markers, avoid using paints containing lead, copper, cadmium, tin, organochlorides (PCBs) or pesticides.

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b) Maintenance and disposal of boats

The hulls of competition boats are usually made of composites (Kevlar®, carbon fibre or glass fibre). The way these are built can give off products which are highly toxic for the people working with them. You should therefore buy only boats which have been built at shipyards which observe strict health and safety standards.

These materials break down only slowly. An abandoned boat hull will therefore become a wreck which is likely to be an eyesore and pollute the landscape for a long time. The same is true of the accessories: rowlocks, seats, etc.

You should therefore:

- Delay as long as possible the time when a boat becomes a wreck: a high-level competition boat can subsequently be used for many years for teaching and training;
- Never get rid of old hulls by sinking them;
- Never dump old hulls in the natural environment;
- Never burn old hulls made of composites, as this could produce toxic smoke;
- Have old hulls and accessories recycled or destroyed by professionals, or take them to supervised waste disposal sites.

The possible recycling methods for the hulls of canoes are the same as those for rowing and sailing boats: incineration, shredding and pyrolysis. Old wooden and canvas boats can simply be incinerated.

4.3.4.5 Other aspects of canoe-kayak linked to sustainable development

Canoe-kayak is a sport which implies a close relationship between people and the aquatic environment. It requires intimate involvement with the natural elements of the aquatic environment, such as currents and the geography of watercourses. In this sense, it is an ideal way of getting to know and respect nature.

Canoe-kayak can be practised in most regions of the world, and can be a way to discover and develop places and societies outside the traditional tourist circuit. Canoe-kayaking is a practice common to many civilisations which, in all areas of the world, have developed by using this means of transport.



Figure 39: Canoe-kayak, a link between civilisations: children on the Amazon.

