

Sit-on-top Kayak First invented by Tim Niemeyer in the early 1980s with the advent of roto-moulded plastic technology, sit-on-top kayaks have revolutionized paddle sports. Today, these craft far outnumber the Eskimo (Inuit)-style decked kayaks. They are easy to use at the entry level, and thus suitable for paddlers lacking seamanship experience (see Fig. S14).

John Gray

SKOANZ: see **Sea Kayak Operators Association of New Zealand**

Slipway

1. The term slipway is sometimes used to refer to the docking area between two piers (though more often this will be referred to as a 'slip'). Typically, a slipway refers to a ramp. One type of slipway is a ramp from the shore to the water by which ships or boats can be moved to and from the water, often for the building and maintenance of vessels. Another type of ramp is used for launching and retrieving small boats on trailers (though the term 'boat ramp' is more often used in such cases).

2. The second meaning of this term is the stern slipway, which was introduced in 1925–1926 for the hauling of **whales** on deck for flensing (removing the skin and fat), thus allowing factory ships to operate at sea (Reeves and Smith, 2003). Large **trawlers** also pull their catches on board through a slipway in the stern. Some offshore support or standby vessels have special stern slipways (stern ramps) built into the transom that enable the direct launching and retrieval of **lifeboats** on board in extreme weather conditions (Sheinberg *et al.*, 2003).

Related internet sources

Stern slipway photo: <http://www.ship-technology.com/projects/stroll/stroll2.html>

Stern boat deployment systems and operability: [http://www.skibstekniskelskab.dk/download/WMTC/B2\(O21\).pdf](http://www.skibstekniskelskab.dk/download/WMTC/B2(O21).pdf)

Stern ramp engaged (photos): http://www.sintef.no/content/page1_2807.aspx

Dagmar Fertl

Smokestack Emissions Air pollution from **cruise** ships is generated by diesel engines that burn high-sulphur fuel, producing sulphur dioxide (SO₂), nitrogen oxide (NO₂) and particulate matter, in addition to carbon monoxide, carbon dioxide and hydrocarbons (Herz and Davis, 2002). Shipboard incinerators also burn large volumes of garbage, plastics and medical waste, producing dioxin, furans and other toxins. Annex VI of the **International Convention for the Prevention of Marine Pollution from Ships (MARPOL)** addresses prevention of air pollution from ships.

Opacity is the visible emission from a smokestack. It is measured by looking through smoke and determining how much of the background is obscured because of the smoke. Opacity cannot be used to measure public health **impacts**; however, the fact that cruise ships are emitting enough visible smoke to produce a haze over **ports** is of significant concern to local citizens, in particular in the State of Alaska. Alaska's Marine Vessel Emission Standards is legislation that provides for state monitoring of opacity air emissions from cruise ships. Violation of these standards is prosecuted, with cruise ship companies fined to pay penalties to the state and reduce their air emissions. Violations of Alaska's emission limits also violate the US Clean Air Act. The Alaska Department of Environmental Conservation is leading the **Alaska Cruise Ship Initiative**, with representatives from the US Coast Guard, Environmental Protection Agency, the South-east Conference, the public and the cruise ship industry to develop voluntary measures in addressing pollution problems associated with cruise ships.

The **cruise industry** is working on emissions reduction practices, such as the use of lower-sulphur fuels, adjusting engine timing, new diesel-electric propulsion systems known as the 'enviro-engines', gas-turbine engines and 'cold ironing', which is where ships are now being modified so they can turn off their engines while docked and plug into a nearby land-based hydroelectric power plant, also known as a shore power 'plug in programme'.

Related internet sources

Cruise Liner Emissions Reduction Incentives Project: <http://www.westcoastdiesel.org/grants/files/Cruise%20Liner%20Project%20Fact%20Sheet.pdf>

Cruise control: <http://www.oceanconservancy.org/site/DocServer/cruisecontrol.pdf?docID=141>

EnviroEngines: http://www.wartsila.com/Wartsila/docs/en/ship_power/media_publications/marine_news/2004_2/enviroengines.pdf

Prevention of Air Pollution from Ships: http://www.imo.org/Environment/mainframe.asp?topic_id=233

North-west Cruise Association: <http://alaska.nwcruise.org/group.cfm?menuId=28>

International Centre for Cruise Research: <http://www.cruiseresearch.org>

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Snorkelling Snorkelling is a recreational activity that can be adapted for participation by almost anybody. In contrast to **scuba-diving** there is no certification required to snorkel. The concept of snorkelling has been around for centuries. Breathing tubes made of reeds, bone and other natural materials were used by hunters and gatherers around the world. Leonardo de Vinci is credited with working on a breathing tube design. The modern-day snorkel is the result of hundreds of years of innovation and improvements. The snorkel, or breathing tube, is only one of the

items of equipment used for snorkelling. Other pieces of equipment commonly used include a mask that covers the eyes and nose, and swim fins. With this basic set of equipment, a person can take up the relatively easy sport of snorkelling.

Snorkelling has proved to be a very popular **leisure** activity because it can be adapted to meet the abilities of participants. Non-swimmers can stand or kneel in shallow water and view fish in many tropical locations. Swimmers can take advantage of protected **reefs** and spend hours on the surface of the ocean, viewing the ocean life below (see Fig. S15).

Because of snorkelling's popularity, tour companies and theme parks have incorporated this activity into their programmes. Some natural areas, such as Hanauma Bay Park in Oahu, **Hawaii**, have suffered environmental degradation due to the large number of people snorkelling in an area. Snorkelling that is not conducted in an environmentally responsible way may lead to the destruction of **coral reefs**. To alleviate environmental issues, snorkelling attractions may be man-made, such as **Xel-Ha** in the Cancún area of Mexico.

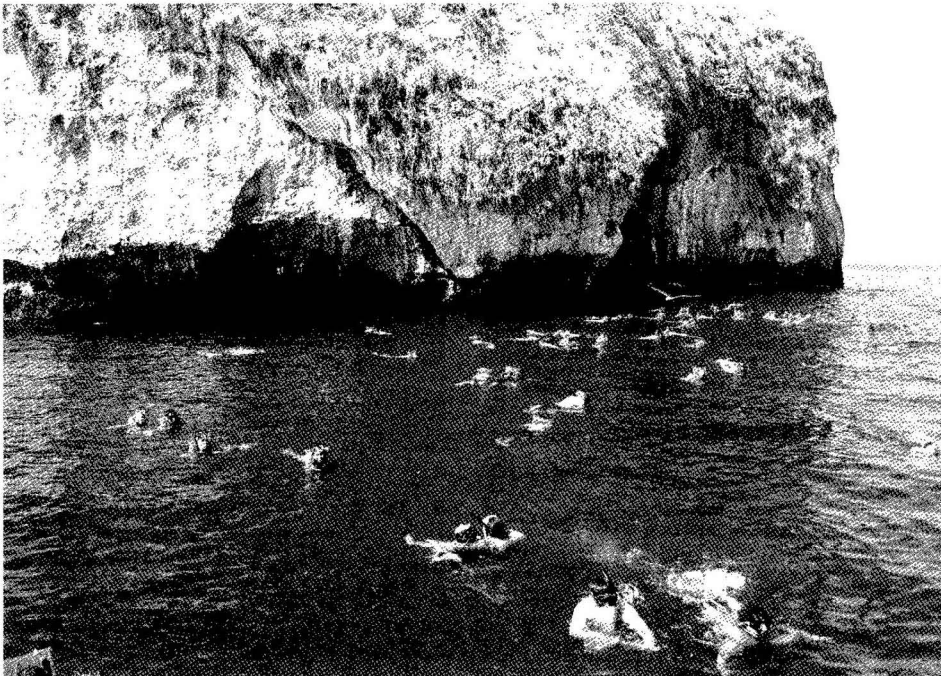


Fig. S15. Snorkelling is a popular leisure activity; three boats have just dropped these snorkellers off at the same time near a small island at Puerto Vallarta, Mexico (photograph courtesy of M. Lück).