

## **AMSTERDAM DOMESTIC WATER SUPPLY SYSTEM—INCLUDING FILTERED AND PURIFIED RHINE RIVER WATER: A MODEL FOR THE FUTURE --**

Note from Prof. Adams: Amsterdam (Netherlands) water purification system, combining filtration through sand dunes followed by modest chemical treatment (including ozone) is known for its high quality. The tap water in Amsterdam (this according to my Dutch colleague Prof. Jan van Mourik of the Geography Dept., Univ. Amsterdam), which includes as much as 60% filtered Rhine river water, is of higher quality than expensive Belgian spring water. No need to buy bottled water when in Amsterdam! Jan van Mourik gave me an all-day tour of the water purification facilities and the filtering dunes and it was indeed extremely impressive. The dunes themselves have been planted to native dune vegetation and constitute an area for recreation by the people of Amsterdam and surrounding parts of The Netherlands. / MSA

### **Below is information from various web sites.**

**AWS transforms water from the Rhine River into potable water for approximately 800,000 people in Amsterdam and surrounding areas.** The Rhine River begins in the Rheinwaldhorn glacier in Switzerland and flows to the North Sea. Along the way, the river collects runoff from the dense cities, open fields, and vast farms it passes.

The 14 steps of the purification process at AWS distill into three main phases. The initial phase removes solid particles through coagulation and settling **plus filtration in the Amsterdam dunes and manmade sand filters.** The next phase targets various micropollutants using ozone in a turbulent reactor, water softening, and biologically activated carbon filtration. In the final polishing phase the water passes through a string of fine filters before going to consumers.

The ozone-approach proves especially effective for AWS. It significantly raises the plant's disinfection capacity since the ozone-treated water is so pure it requires no chlorination. In fact, last year AWS received an honor for providing the highest quality drinking water in the Netherlands.

Above is from web site:

[http://www.comsol.com/industry/htmlpaper/hofman\\_water\\_purification/](http://www.comsol.com/industry/htmlpaper/hofman_water_purification/)

#### **Amsterdam by the Sea**

'Amsterdam by the Sea' is the boast of the Municipality of Zandvoort, which enjoys no fewer than nine kilometres of sandy beach flanked by rolling dunes. Within the municipal boundaries one finds the protected 2,500-hectare National Park Zuid-Kennemerland and a 3,300-hectare nature reserve, **the Amsterdamse Waterleidingduinen (Amsterdam Water Board Dunes), where the Dutch capital's drinking water is filtered through the natural sand dunes to achieve a purity reputed to rival spring water.** Both are open to visitors, with a network of walking and cycling paths amidst beautiful surroundings.

Above from

[http://www.iamsterdam.com/doing\\_business/amsterdam\\_area/zandvoort?mode=print](http://www.iamsterdam.com/doing_business/amsterdam_area/zandvoort?mode=print)

Photo of dunes through which the water is filtered is available at:

[http://en.wikipedia.org/wiki/Image:Amsterdamse\\_Waterleidingduinen-02.jpg](http://en.wikipedia.org/wiki/Image:Amsterdamse_Waterleidingduinen-02.jpg)

the chemical treatment aspect of Amsterdam water (that augments the sand filtration) is also described at the site below:

[http://www.comsol.com/shared/downloads/stories/hofman\\_water\\_purification/hofman\\_water\\_purification.pdf](http://www.comsol.com/shared/downloads/stories/hofman_water_purification/hofman_water_purification.pdf)

The company Waternet is a key part of water purification system for Amsterdam; unfortunately most of their information is only in Nederlands (Dutch language); below is the Waternet URL relevant to the dune-based water filtration procedures and recreational issues that are interconnected use of the dunes themselves.

[http://www.waternet.nl/natuur\\_en\\_recreatie/struinen\\_door\\_de](http://www.waternet.nl/natuur_en_recreatie/struinen_door_de)