# DRINKING WATER SUPPLY

## Why the need for aeration of the raw water supply source?

**In summer, water quality in eutrophic lakes and reservoirs is poor at all levels of the water body.**



*Pao Cachinche Lake before treatment*

- The bottom waters (hypolimnion) are oxygen-poor and characterised by high iron, manganese, and ammonia concentrations.
- The upper layers (epilimnion) feature large phytoplankton populations –including toxic blue-green algae - and high levels of turbidity and organic matter.
- Middle-layer (metalimnion) characteristics change randomly, fluctuating between those of the upper and lower layers.

## Consequences of eutrophication
## for the drinking water treatment process

**Eutrophication is a major hinderance to the drinking water treatment process and to treatment plant operation.**



*Grangent lake before treatment*

- Need for iron and manganese removal.
- Need to continuously check the raw water supply source when drawdawn is via a multi-level intake.
- Need to continually adjust reagent levels.
- High chlorine requirement due to the presence of chloramines.
- Premature clogging of filters and high sludge production.
- Risk of toxin development when supply source contains blue green algae.
- Risk of bacterial growth in distribution system.
- Treated water supply vulnerable to taste and odour problems.

**Eutrophication impacts on treatment plant investment and operation costs and may affect taste and odour in the drinking water.**

# Benefits of bottom-water aeration for the quality of the raw water supply source



*Pao Cachinche Reservoir (Venezuela)*

*Treated area*        *Untreated area*

- Significant reductions in iron and manganese concentrations.
- Elimination of ammonia.
- Phosphorus releases sharply curbed.
- Blue-green aglae replaced by green algae.
- Reduction in turbidity.
- Year-round uniformity of water quality.
- Greater effectiveness of chlorination.
- Large reduction in the consumption of reagents and filter wash water. (see following tables).
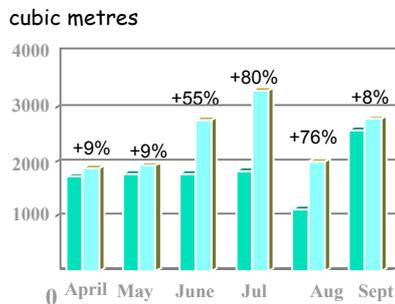


*Average volumes filtered between two filter washes (Flers Treatment Plant ) before and after destratification*



*Las Furnas Lake (Portugal) following aeration*

| Substance | Function | Cost (€) | | Cost Reduction Between 1992 and 1994 (€) | % |
|---|---|---|---|---|---|
| | | 1992 | 1994 | | |
| Chlorine | Disinfection | 22 040 | 8 190 | 13 850 | -63 |
| Iron sulphate | Coagulation | 74 670 | 67 684 | 6 985 | -9,3 |
| Lime | Softener | 22 100 | 65 637 | 47 933 | -42,2 |
| DAD | Aeration | 0 | 21 197 | - 21 197 | +100 |
| | TOTAL | 210 279 | 162 707 | 47 572 | -23 |

*Comparison of reagent costs before and after installation of Hanningfield destratification system (UK).*



*Grangent Lake following aeration*