

Low-cost Wastewater Management

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Low-cost wastewater management

Two parts:

1. **Simplified sewerage**
[wastewater collection]
2. **Waste stabilization ponds**
[wastewater treatment]

Simplified sewerage

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- a minimum tractive tension of 1 N/m²
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“Small flows flow better in small pipes”

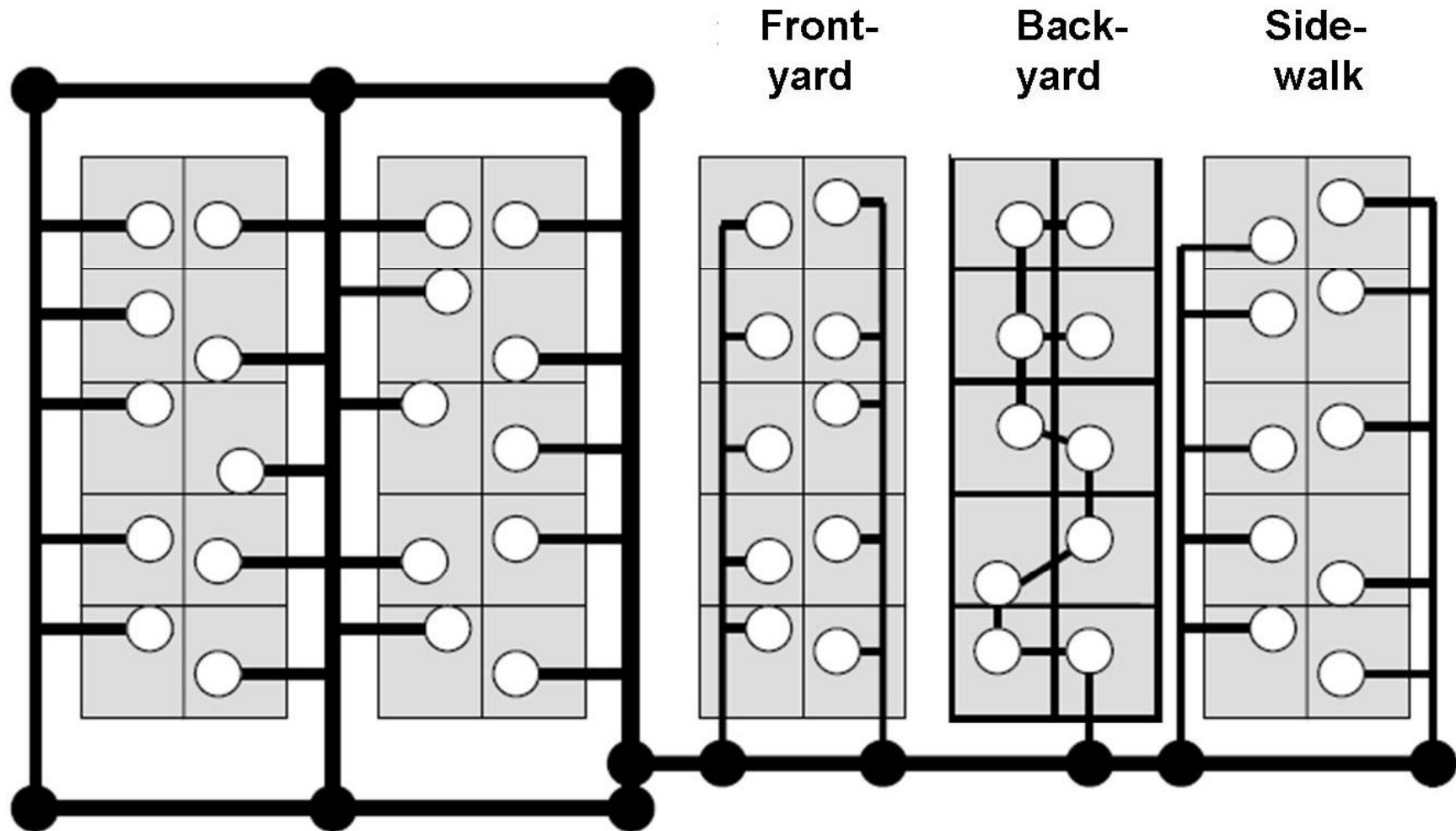
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CONVENTIONAL SEWERAGE

SIMPLIFIED/ CONDOMINIAL SEWERAGE



Simplified sewerage costs

BRAZIL

**Simplified sewerage:
US\$ 56 per connection
Conventional sewer-
age: US\$ 94**

1997



SOUTH AFRICA

**Simplified sewerage:
€250–300 per conn'n
Conventional sewer-
age: €600–700**

2002





Brasília: a very rich area...



... being served with
simplified sewerage



**No expensive
manholes!**

Plastic sewer
junction

CAESB, the water & sewerage company for Brasília and the Federal District, basically asked itself:

If condominial sewerage works well in poor areas, shouldn't it also work well in non-poor areas? *Answer: Yes.*

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The next question is:

As condominial sewerage works well in both poor and non-poor areas, should we ever use conventional sewerage in urban housing areas? *Answer: NO.*

Waste Stabilization Ponds

Entirely natural form of treatment – no electromechanical equipment, so no electricity (lower C footprint)

Usually just an anaerobic pond and a facultative pond

Anaerobic pond: odourless if well designed!

Facultative pond: algae supply the O₂ for the pond bacteria (hence no electricity)



1. Anaerobic pond

Small WSP system in Bavaria

Village of Berg, near Munich: 250 population



2. Facultative pond



Infiltration bed

**Effluent
channel**





Infiltration bed

**Effluent
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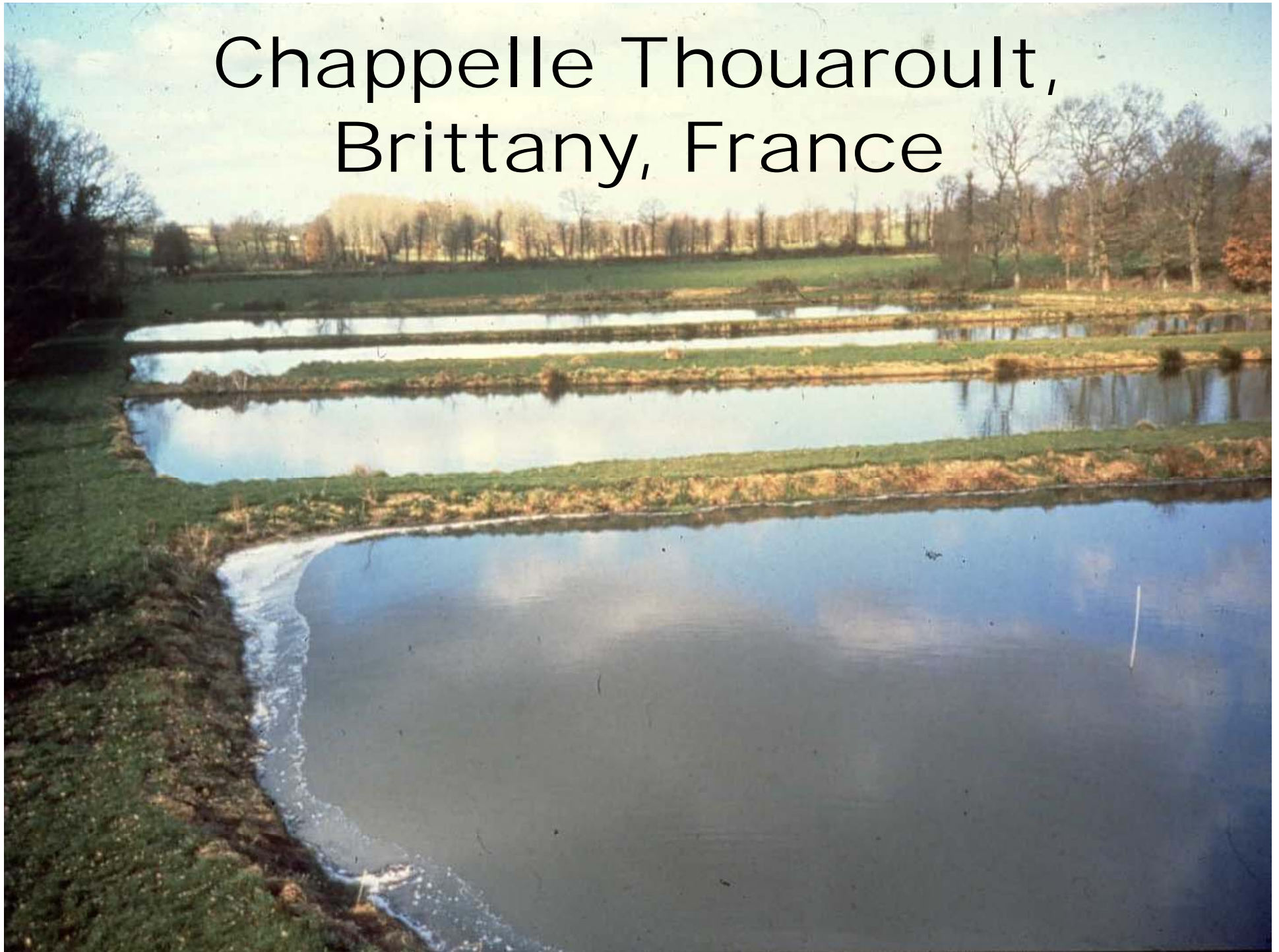
**Germany: ~3000 WSP systems
(mostly for pop's <1000)**

Capital and O&M costs of various wastewater treatment processes for 500 p.e. in Germany in 1996

Treatment process	Capital costs (DM p.e. ⁻¹)	O&M costs (DM m ⁻³)
Activated sludge	2,000	2.00
Trickling filter	1,500	1.70
Aerated lagoon	1,200	1.70
Vertical-flow CW	1,200	1.50
Horizontal-flow CW	1,500	1.30
WSP	700	1.20

Average 1996 exchange rate: DM1 = €0.53

Chappelle Thouaroult, Brittany, France



Chappelle Thouaroult, Brittany, France

**France: ~2500 WSP systems
(mostly for pop's <1000)**

Capital and O&M costs of various wastewater treatment processes for 1000 p.e. in France in 1998

Treatment process	Capital costs (€ p.e. ⁻¹)	O&M costs (€ p.e. ⁻¹ a ⁻¹)
Activated sludge	230	11.50
Trickling filter	180	7.00
RBC	220	7.00
Aerated lagoon	130	6.50
Settler-digester + CW	190	5.50
WSP	120	4.50

Wastewater
management
does not have to
be complicated
or expensive!