Combined Sewer Overflow on-site treatment by extensive systems

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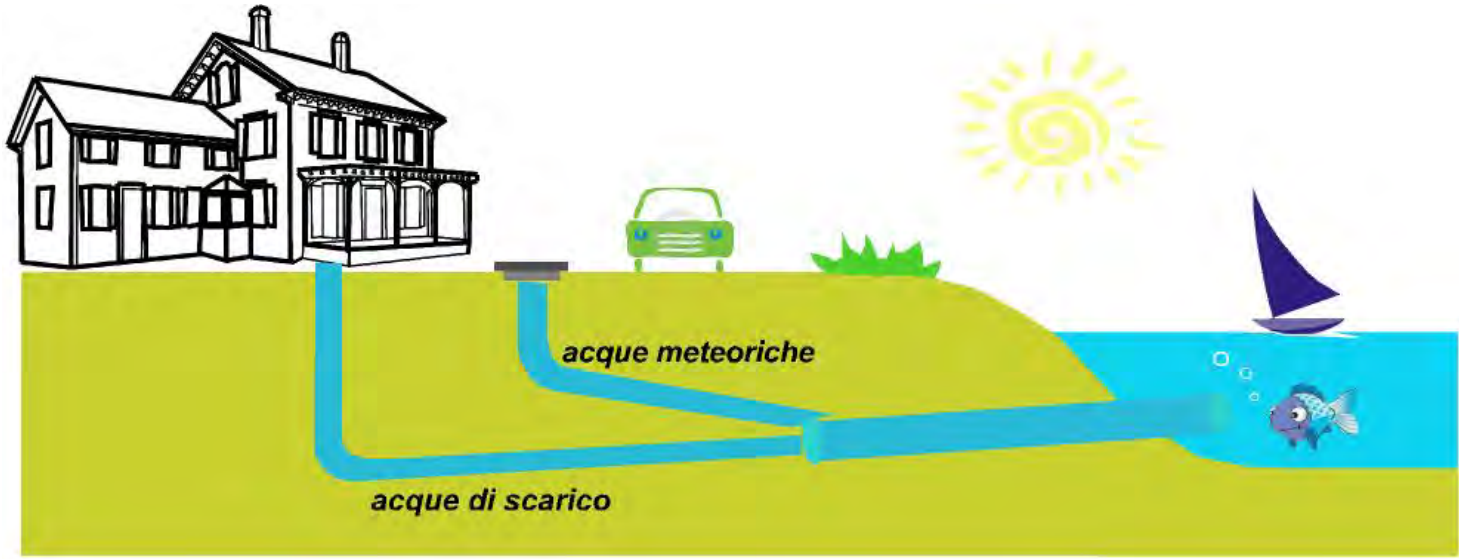
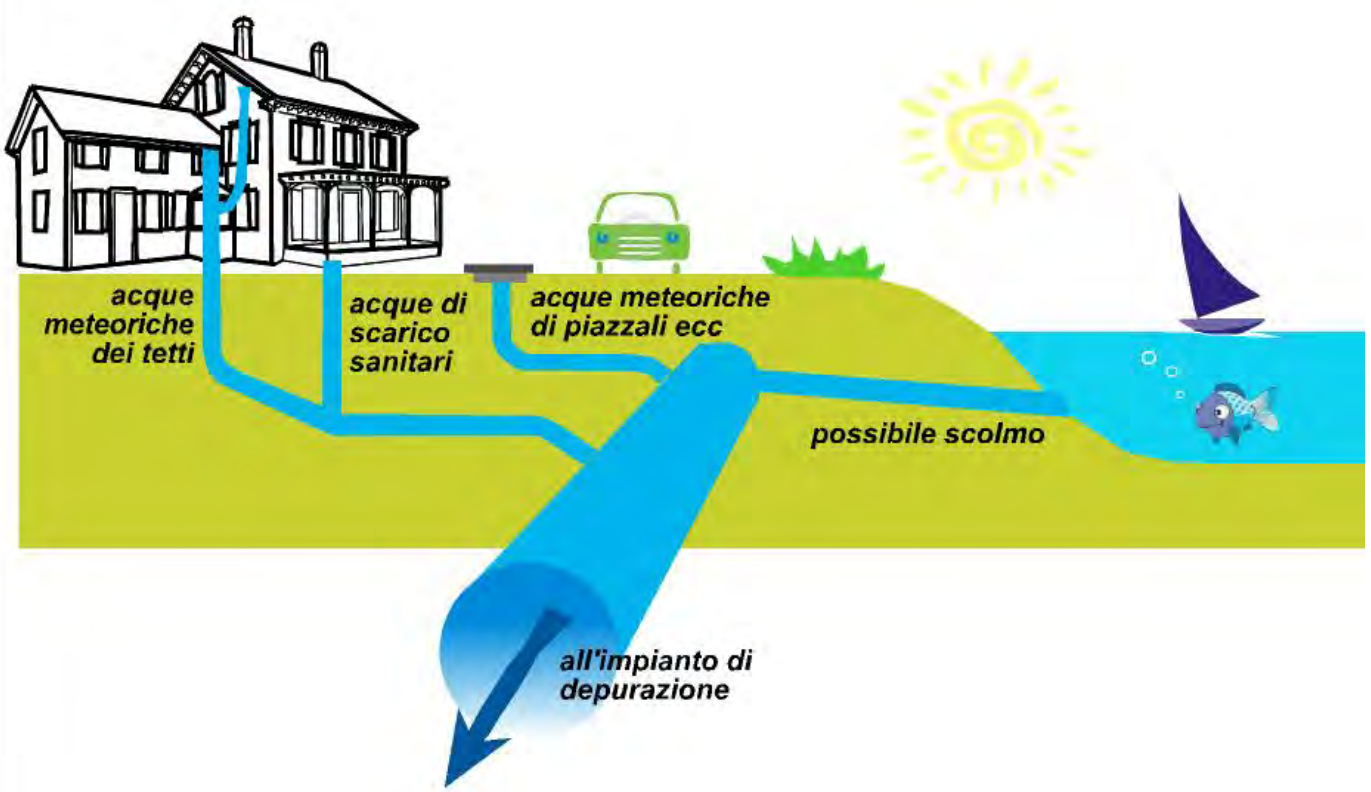
R&D Manager - IRIDRA

THE PROBLEM



Mixed sewers represent the most adopted solution for the colletion of untreated wastewater: the high flux of water permits the transport of solids and the wash-out of the sediments at every rain event.

THE PROBLEM



… but this solution generates side-effects whenever the sewer is connected to a treatment plant;

It's in fact necessary to realise CSOs for eliminating the overloads to the WWTP.

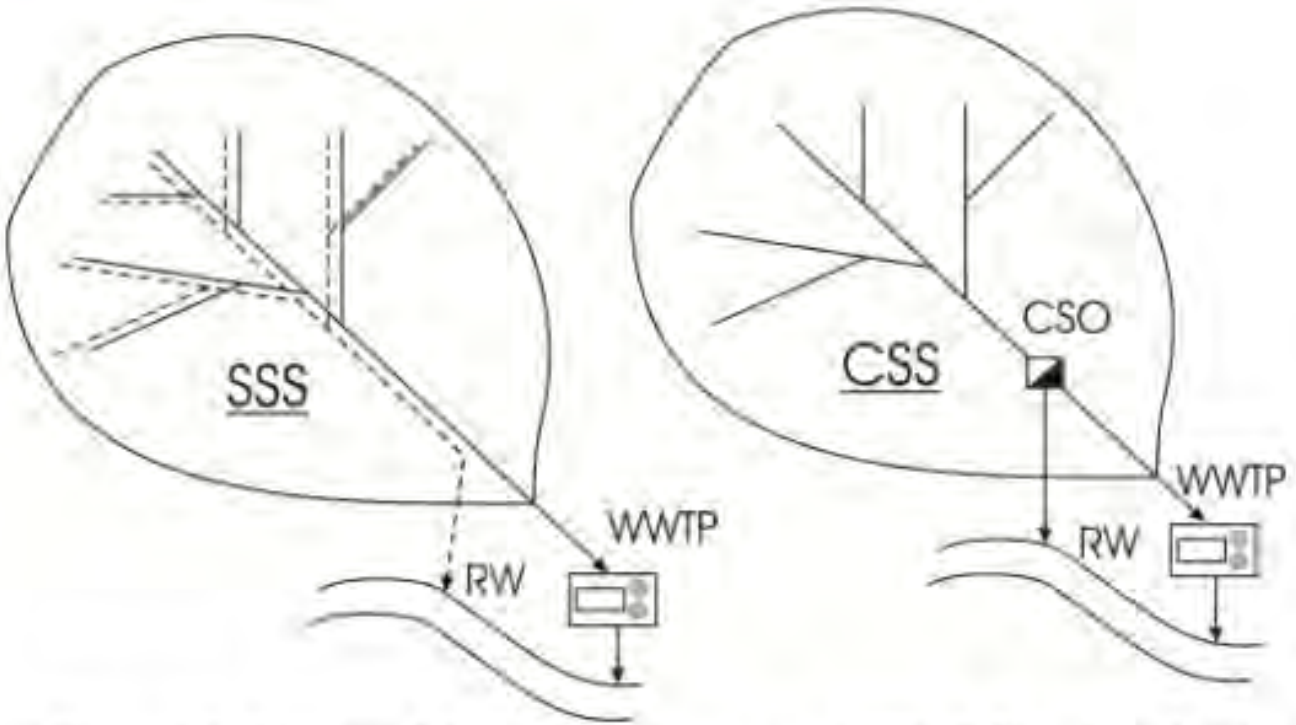
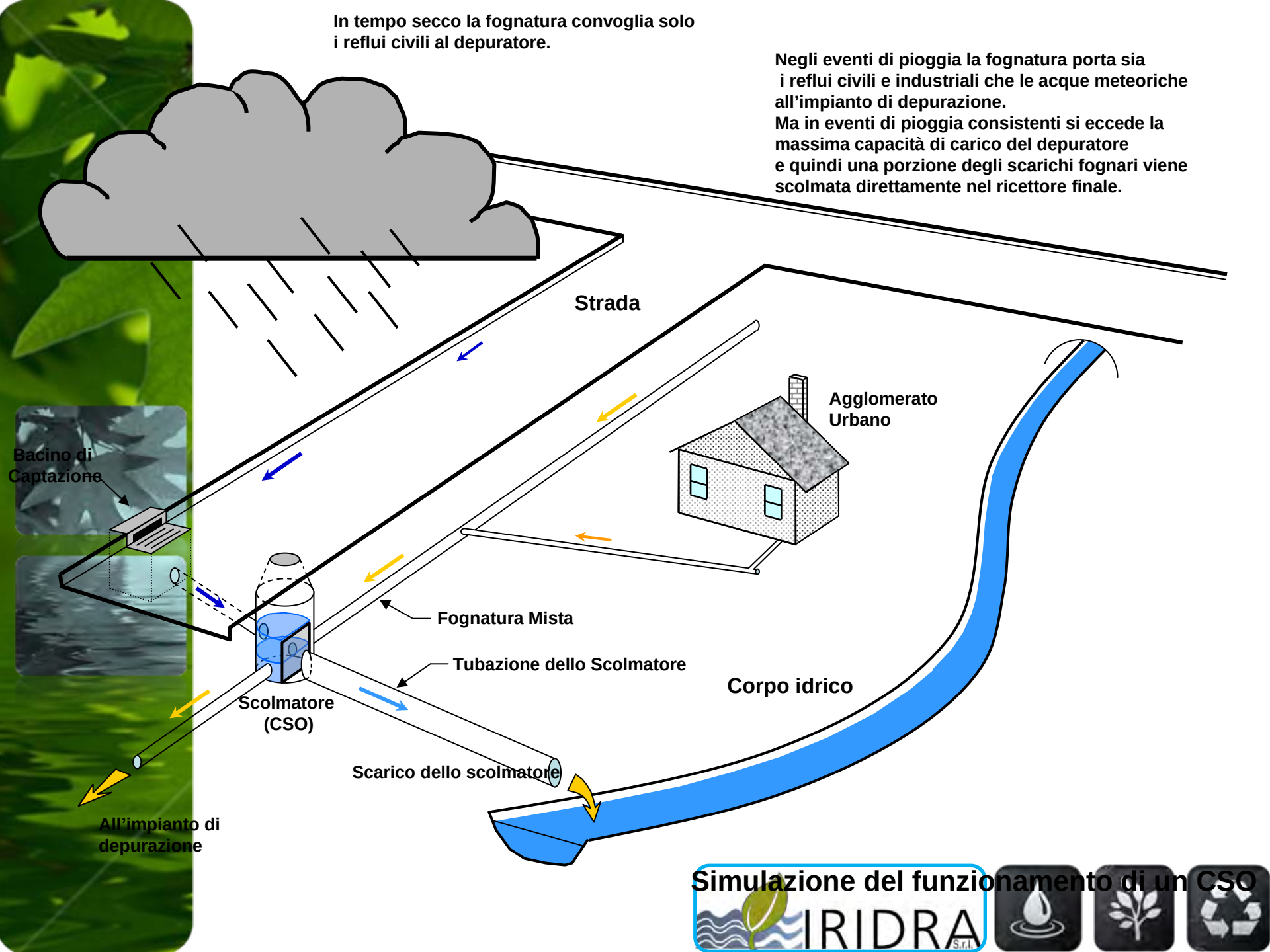


Figure 1-2. Schemes of the separate sewer system (SSS) (left) and combined sewer system (CSS) (right). RW = receiving water, WWTP = wastewater treatment plant, CSO = combined sewer system.

In tempo secco la fognatura convoglia solo i reflui civili al depuratore.

Negli eventi di pioggia la fognatura porta sia i reflui civili e industriali che le acque meteoriche all'impianto di depurazione.
Ma in eventi di pioggia consistenti si eccede la massima capacità di carico del depuratore e quindi una porzione degli scarichi fognari viene scolmata direttamente nel ricettore finale.



Simulazione del funzionamento di un CSO

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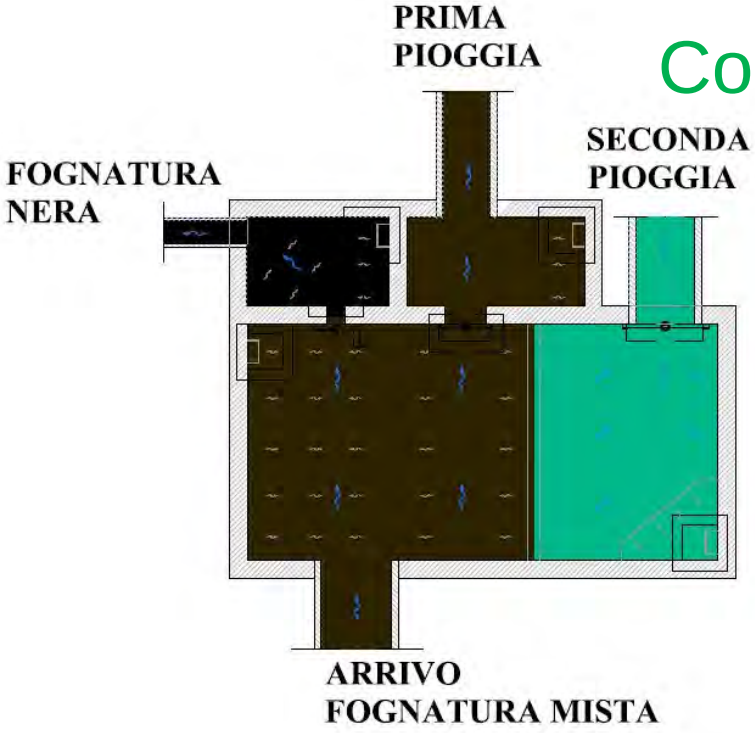
Combined Sewer Overflow

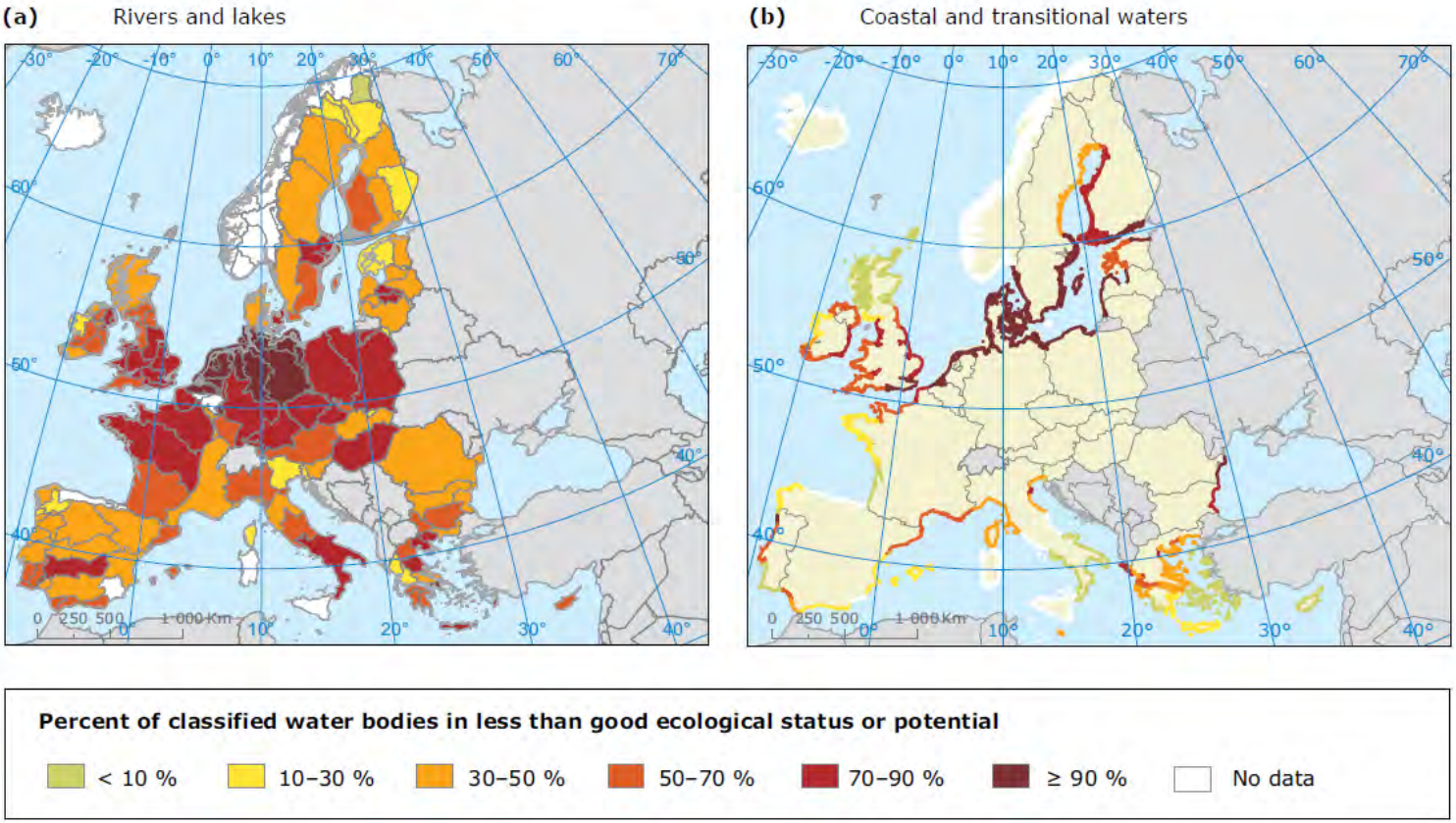


CSOs SIDE-EFFECTS

- Decrease of water quality in the receiving water bodies
- Higienic-sanitary problems
- Increase of the flooding risk

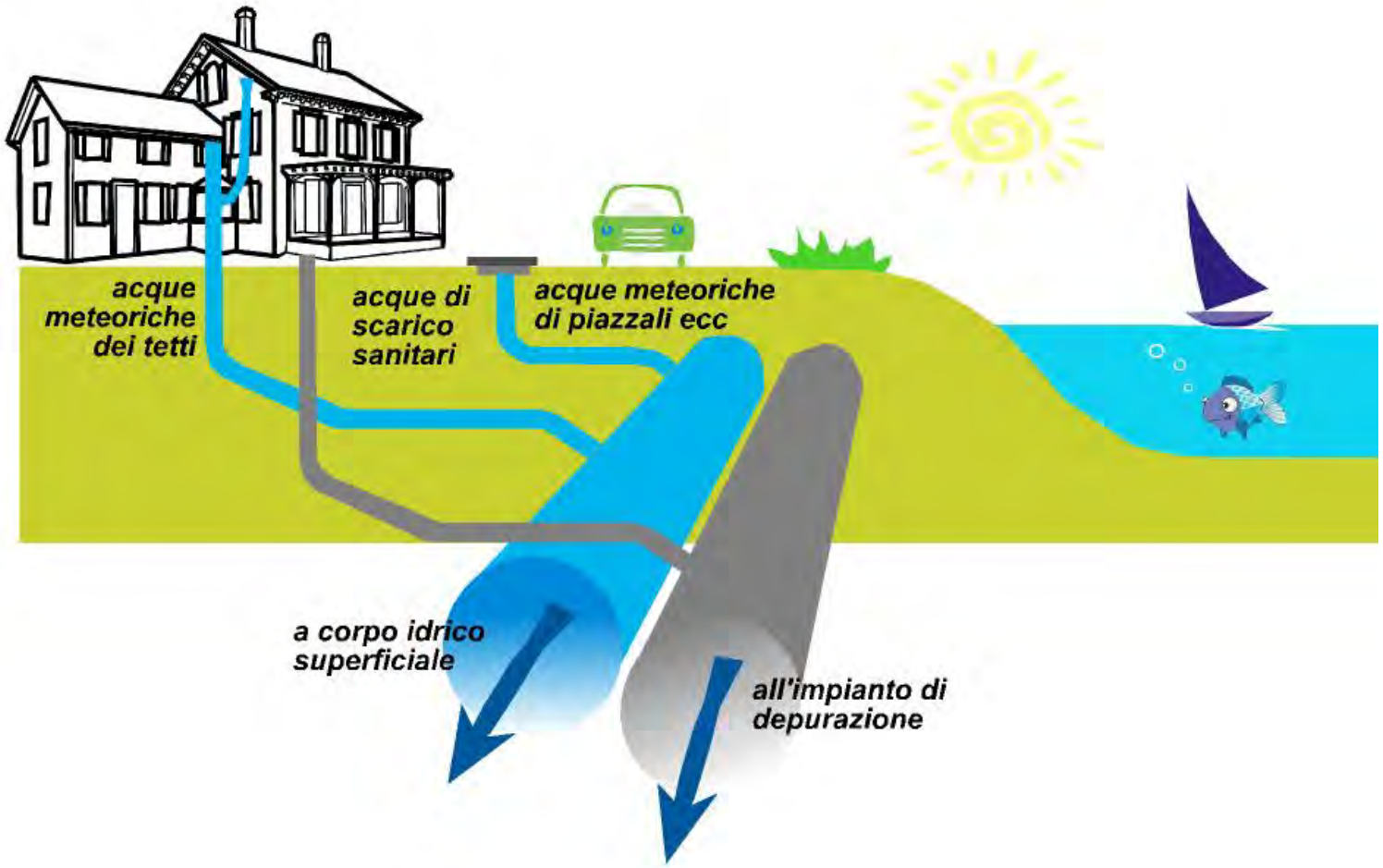


Map 2.1 **Proportion of classified surface water bodies in different RBDs holding less than good ecological status or potential, for rivers and lakes (a) and for coastal and transitional waters (b)**



EEA Report No 9/2012

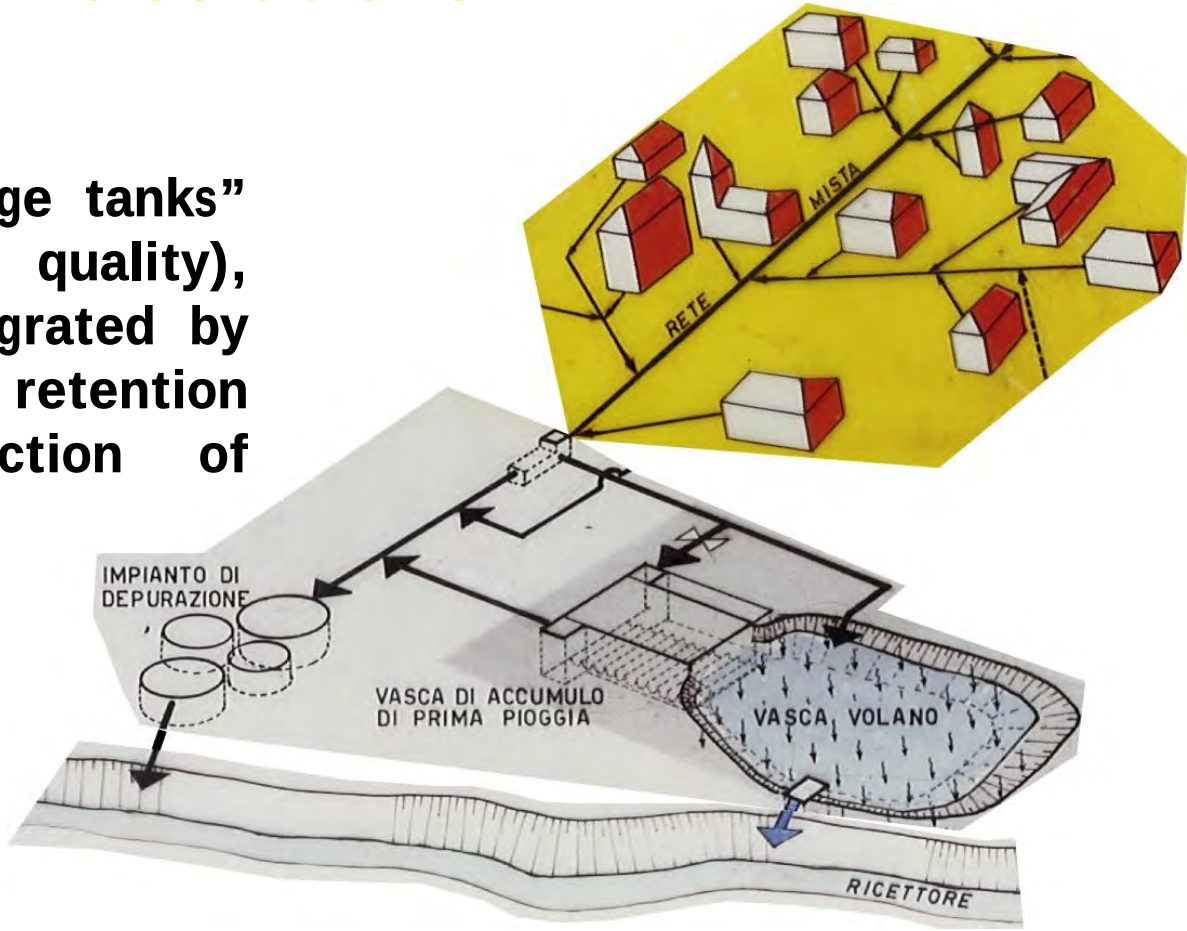
2.2 million km of existing sewerage systems in Europe



Segregation of fluxes: high investments and long realisation time

The solutions

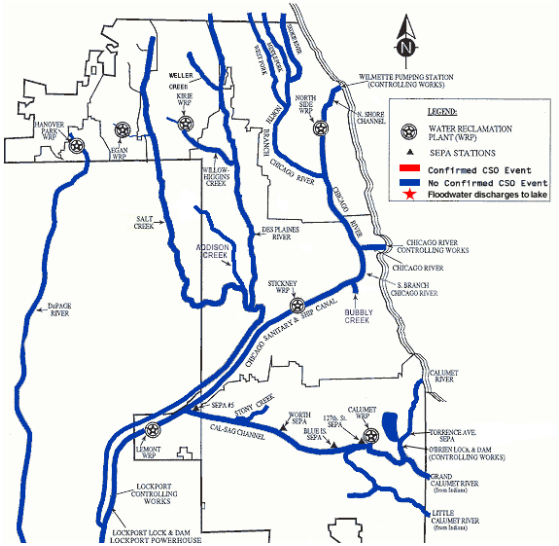
“1° flush storage tanks” (water quality), eventually integrated by “extended retention basins” (reduction of flood risk)

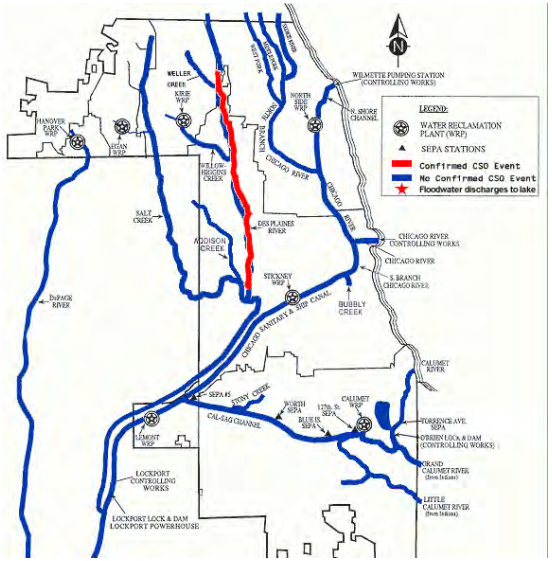


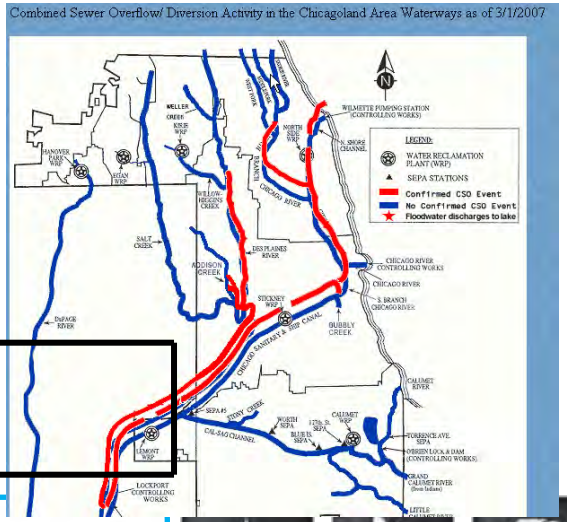
UK: 31000 CSOs

USA: above 100000

ITALY: above 50000







Chicago:	TARP Tunnel And Reservoir Plan 180 km of underground tunnel

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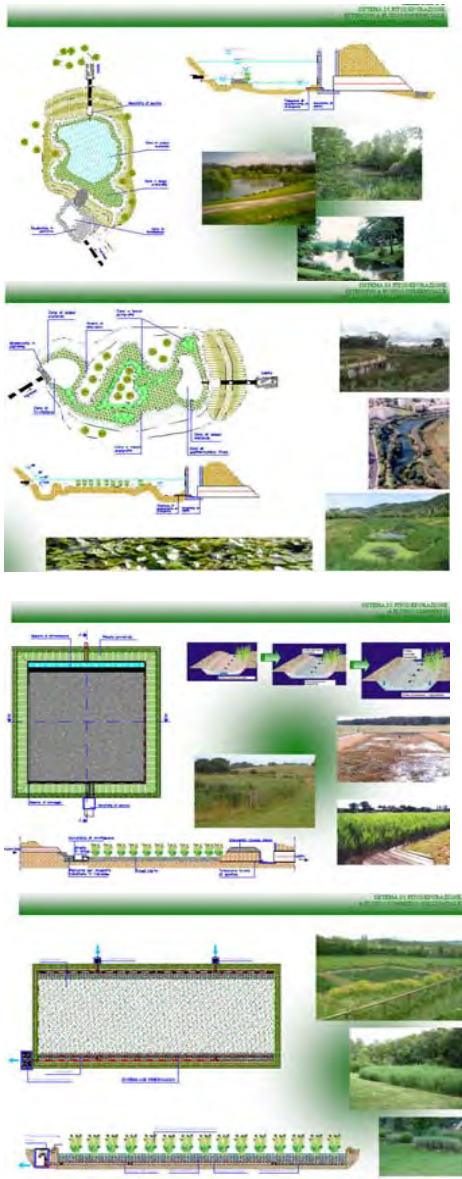
Wien:	Wien River Relief Sewer 2600 m of underground tunnel below the Danube Total cost: 82.7 M € Diameter: about 9 m Excavated Volume: 190.000 m3 Concrete: 60.000 m3 Steel: 10.000 ton

Natural systems for CSO treatment	Country
Modified FWS, often inserted in fllod protection basins, vegetated extended retention basins	USA, Australia, UK
Modified VF CWs, often located after a 1st flush tank	Germania, Austria
HF CWs, often located after rainwater filters (i.e. copasack) or 1st flush tanks	UK



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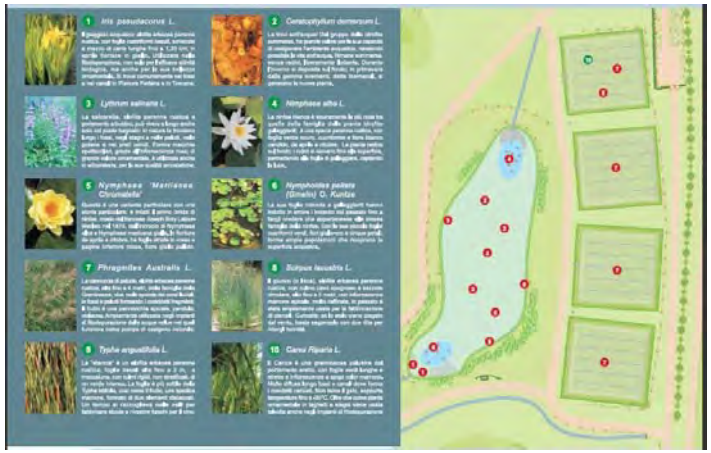
Not only treatment: ES Ecosystem Service



Reconstitute the lost NC (Natural Capitals)

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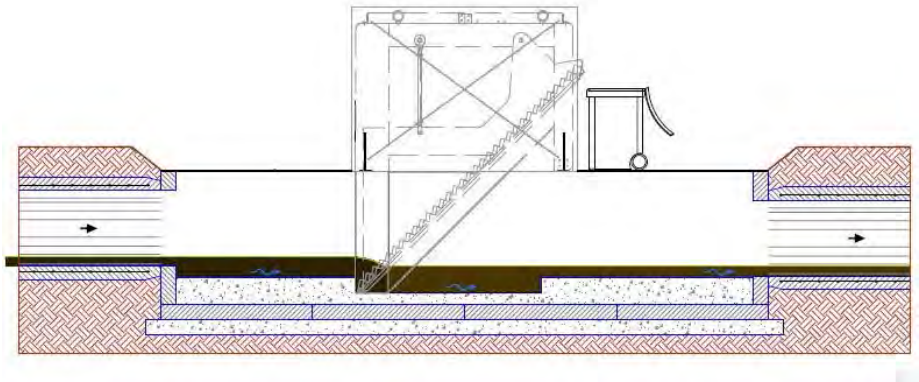
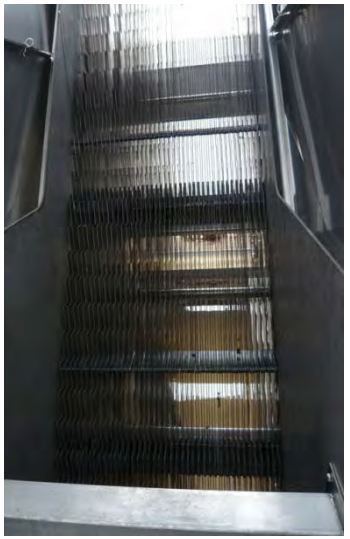
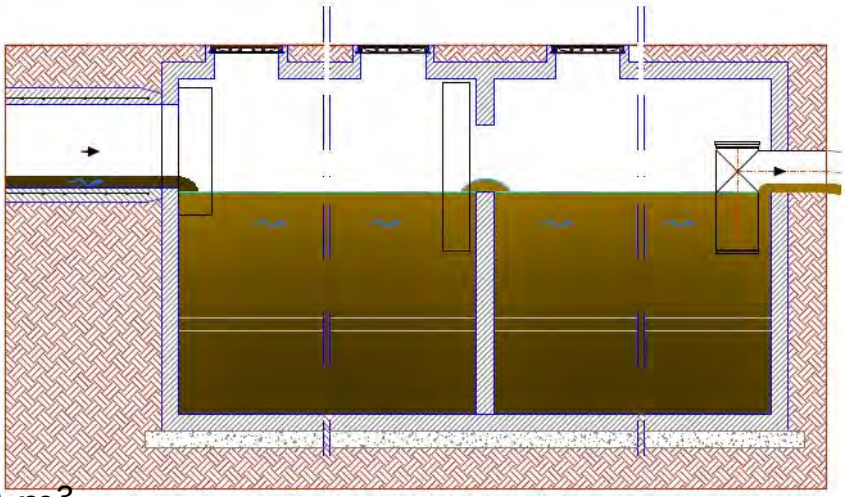
Grid





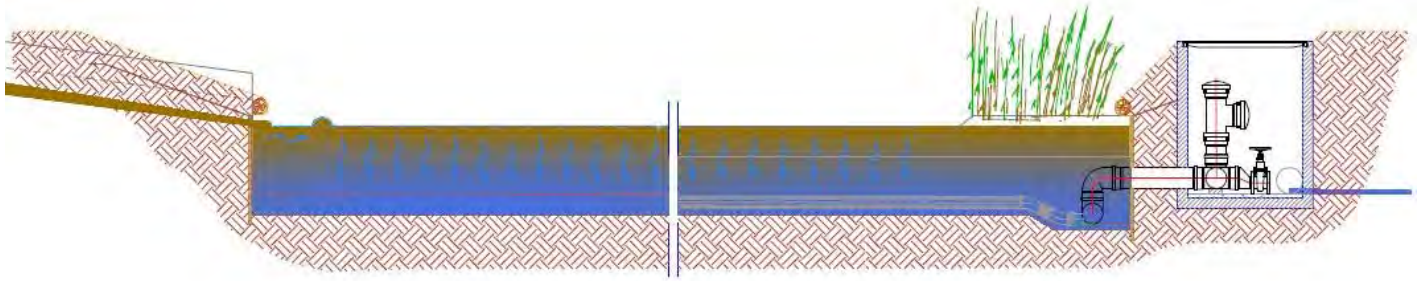
Consumption: less than 1 KW per day…

Settler

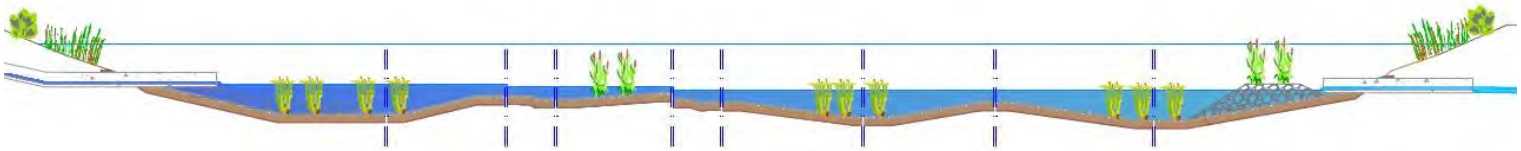


Volume 150 m³

VF CWs



FWS CW – Extended retention basin

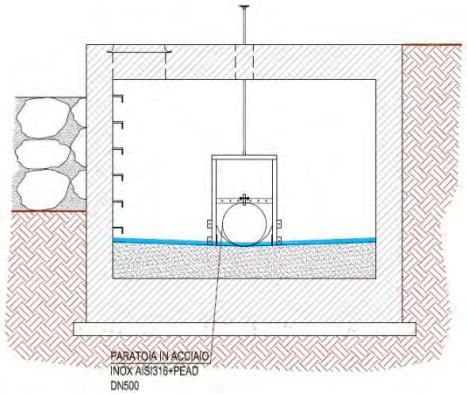


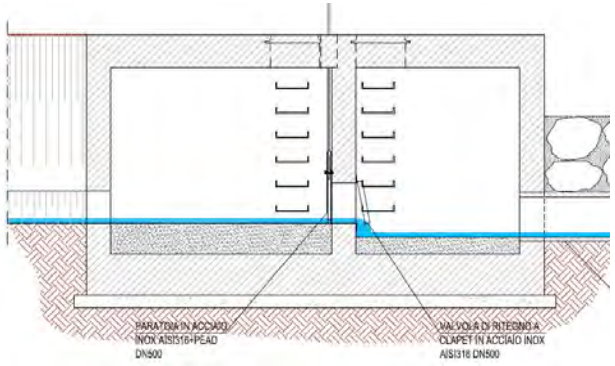
A = 3200 m²

Extended Retention Basin – Outlet device

V = 7700 m³

Outlet


PARATOIA IN ACCIAIO
INOX AISI316+PEAD
DN500


PARATOIA IN ACCIAIO
INOX AISI316+PEAD
DN500
VALVOLA DI RITEGNO A
CLAPET IN ACCIAIO INOX
AISI316 DN500

LYON

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CSOs are diffused everywhere urbanisation took place with consequent loss of NC

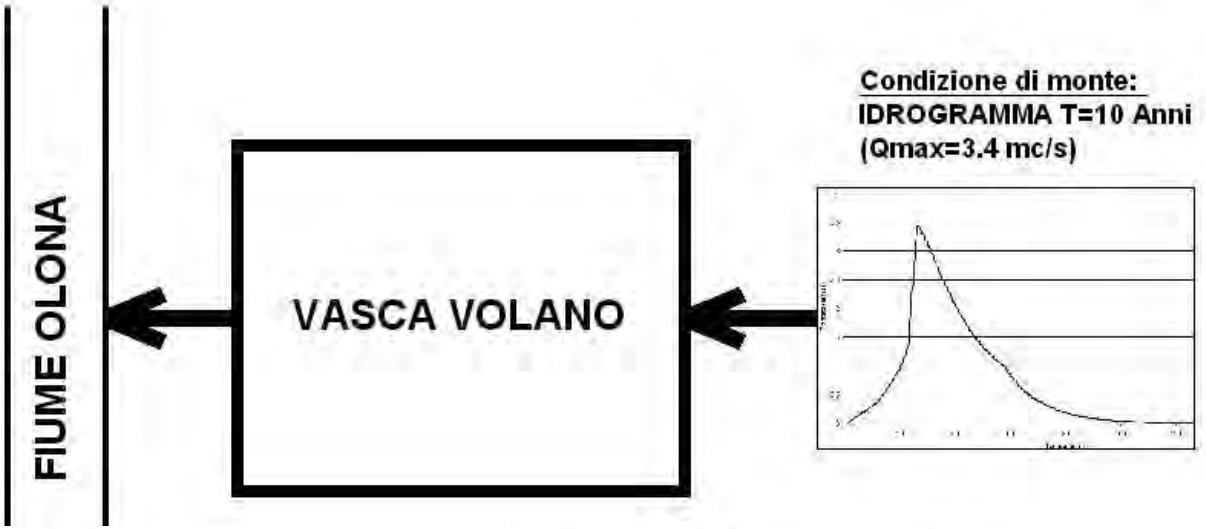
They represent a great occasion for recovering this loss by the creation of new ESs

For the EC this could generate a flux of green economy /green jobs in the order of 50-100 billions of euro

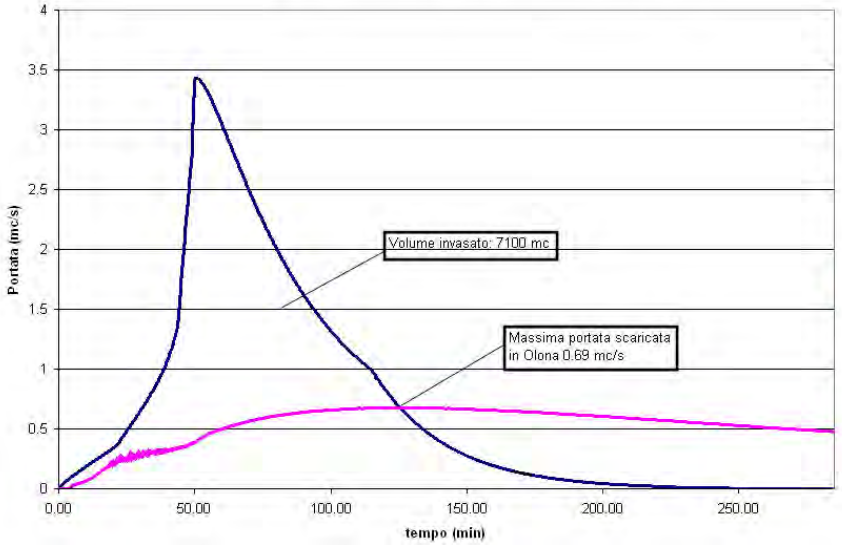
Flood protection

Vlam = **7.700 mc**

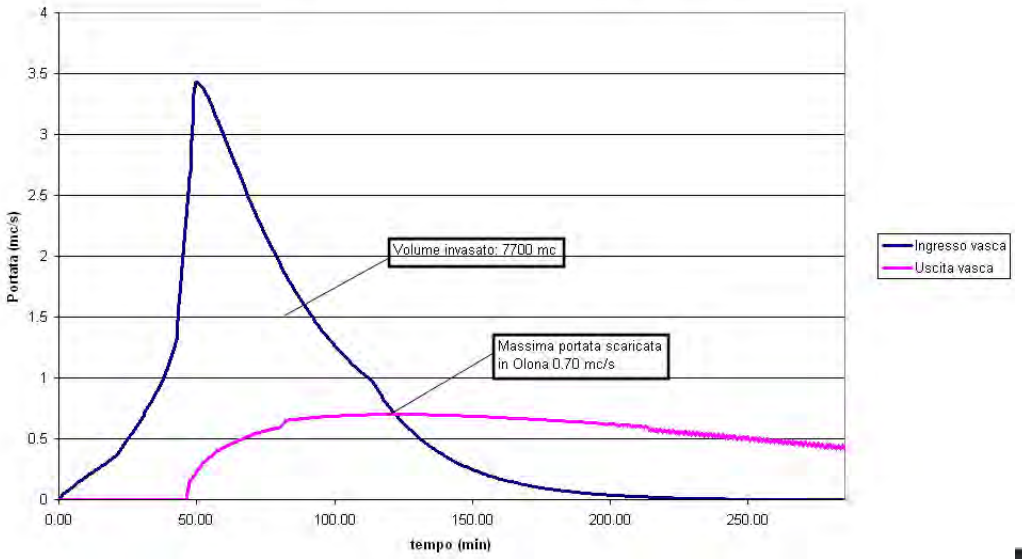
Condizione di valle:
Livello Olona in due assetti -
1) 217.50 m s.l.m. condizioni di magra (funzionamento vasca non rigurgitato)
2) 218.49 m s.l.m. evento T=10 anni



Idrogrammi scenario 1 (funzionamento non rigurgitato)



Idrogrammi scenario 2 (funzionamento rigurgitato)



AUTORITA' DI BACINO DEL FIUME PO
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STUDIO MAIONE INGEGNERI ASSOCIATI
AMBIENTEITALIA S.r.l.
LANDMilano

NO SUDS?

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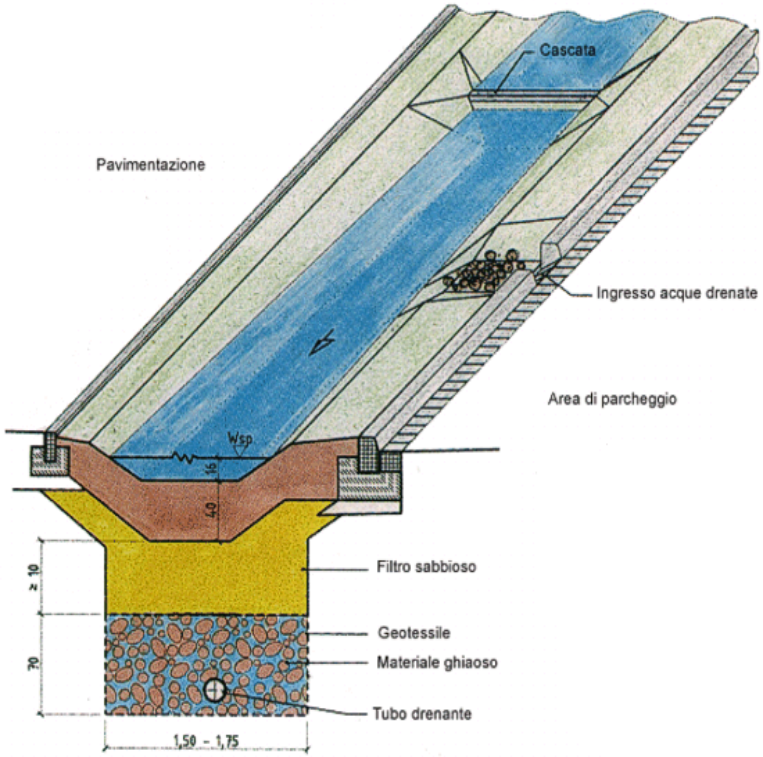
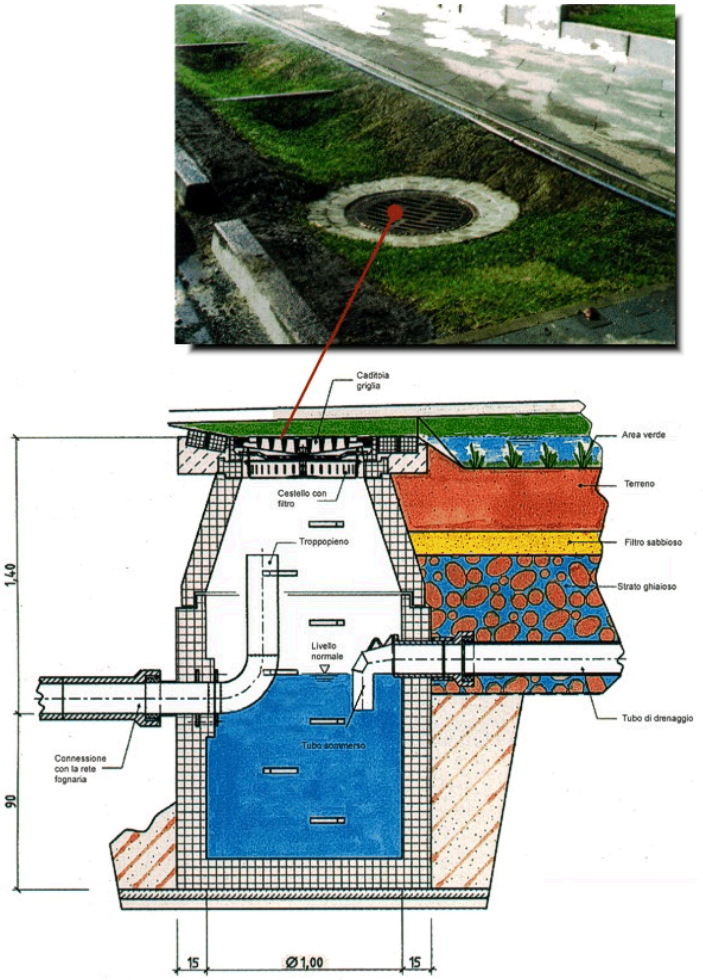
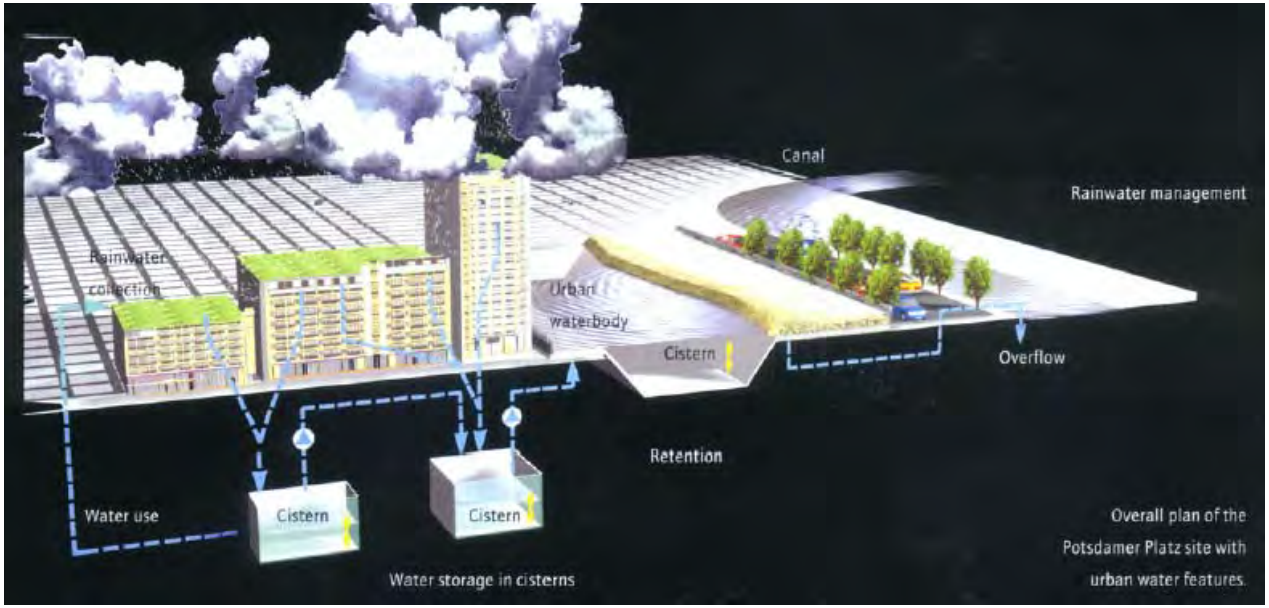
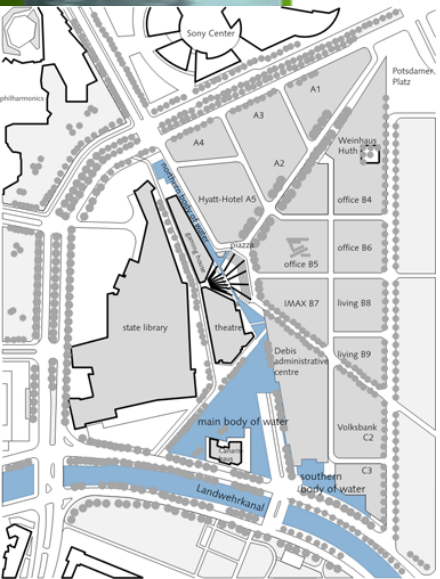
SUDS - Hannover

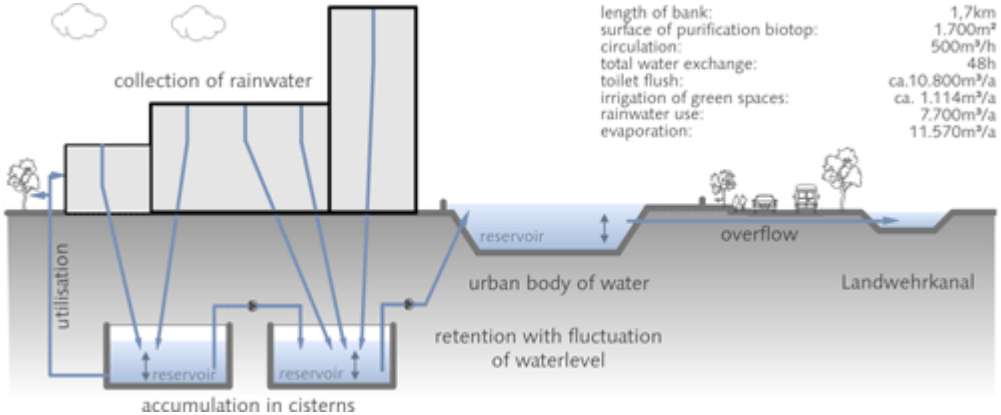




SUDS - Berlin







length of bank:	1,7km
surface of purification biotop:	1.700m²
circulation:	500m³/h
total water exchange:	48h
toilet flush:	ca.10.800m³/a
irrigation of green spaces:	ca. 1.114m³/a
rainwater use:	7.700m³/a
evaporation:	11.570m³/a

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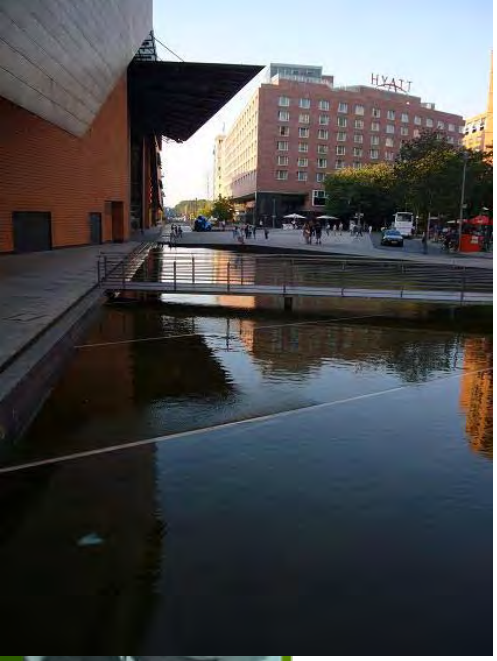

Berlin – Postdamer Platz

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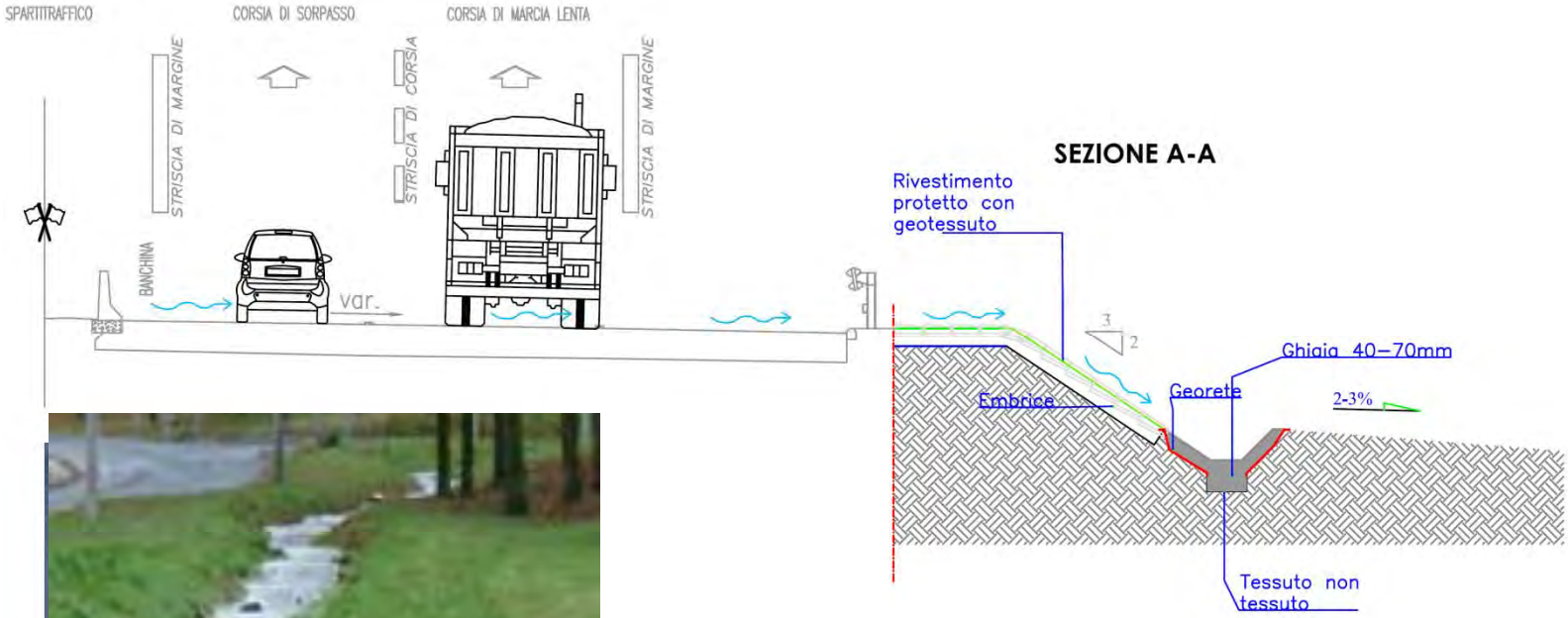
SUDS – USA – Rain Gardens

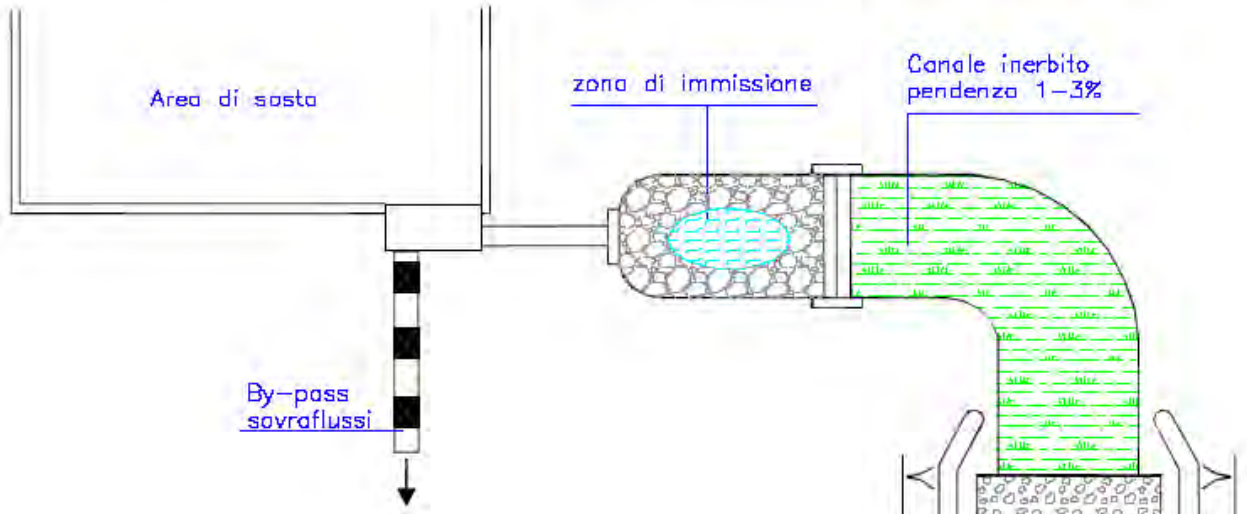

www.wsud.org


www.wsud.org


www.wsud.org


www.wsud.org


SPARTITRAFFICO
CORSIA DI SORPASSO
CORSIA DI MARCIA LENTA
STRISCIA DI MARGINE
STRISCIA DI CORSIA
STRISCIA DI MARGINE
BANCHINA
var.
SEZIONE A-A
Rivestimento protetto con geotessuto
3
2
Ghiaia 40–70mm
Georete
Embrice
2-3%
Tessuto non tessuto


Area di sosta
zona di immissione
Canale inerbito
pendenza 1–3%
By–pass
sovraflussi

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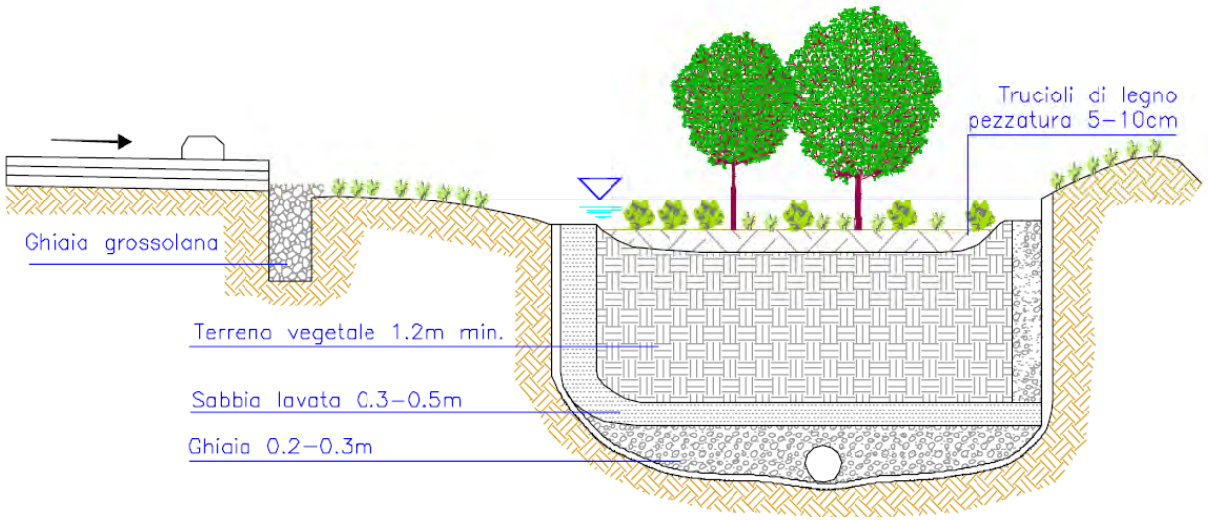
Trucioli di legno
pezzatura 5–10cm
Ghiaia grossolana
Terreno vegetale 1.2m min.
Sabbia lavata C.3–0.5m
Ghiaia 0.2–0.3m

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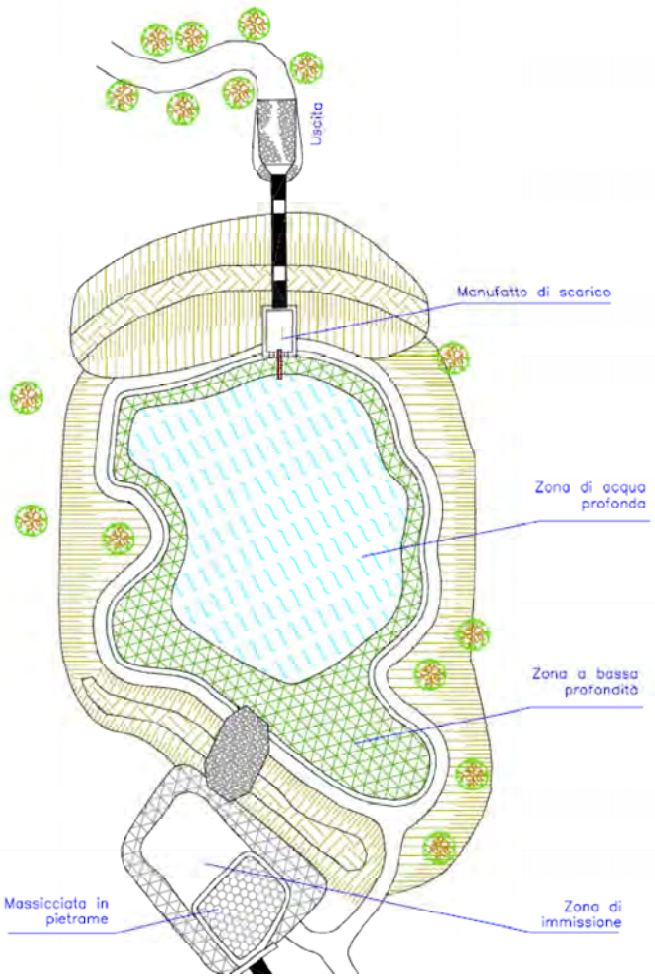
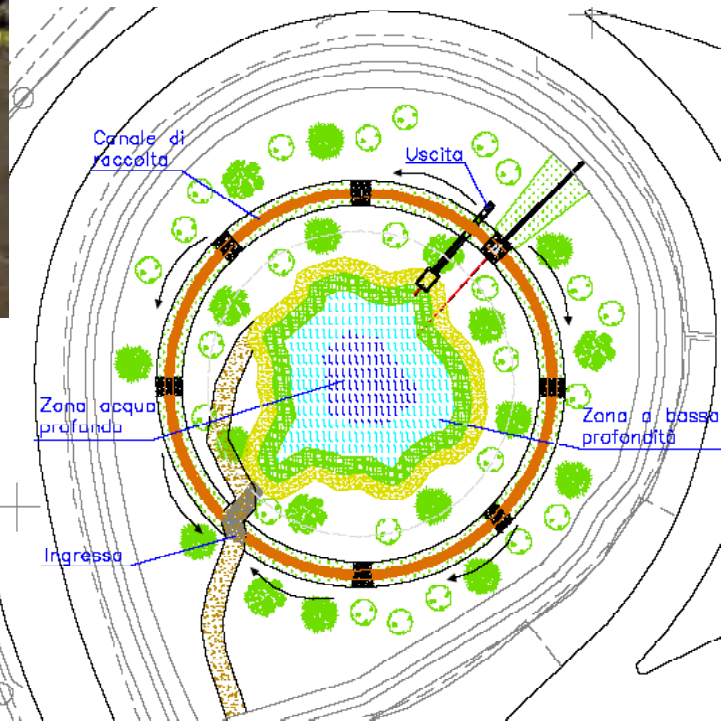
stagno umido




Canale di raccolta
Uscita
Zona acqua profonda
Zona a bassa profondità
Ingresso

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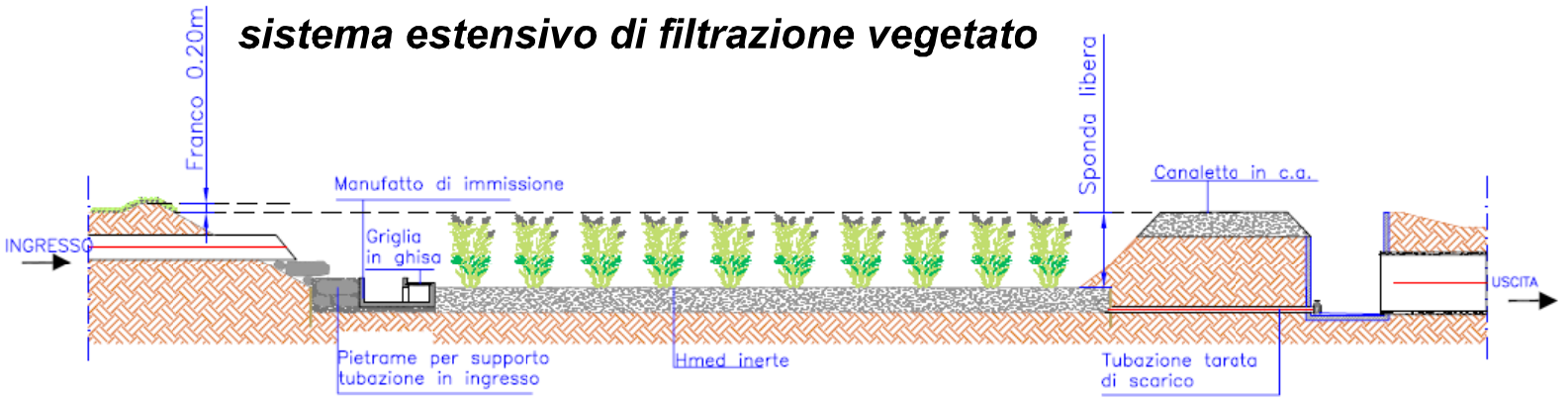
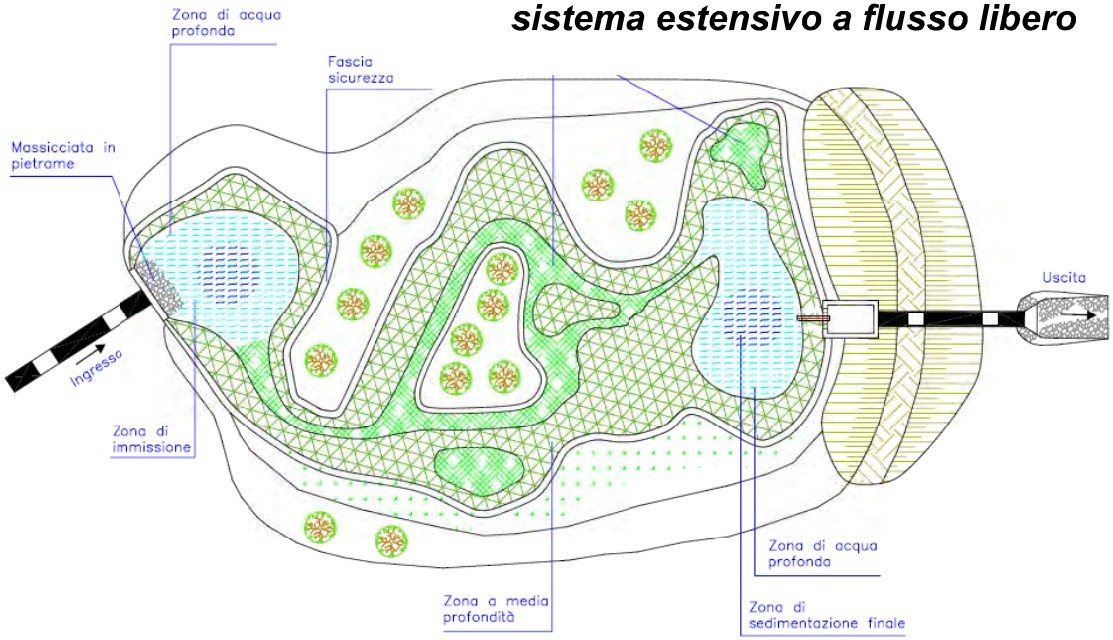
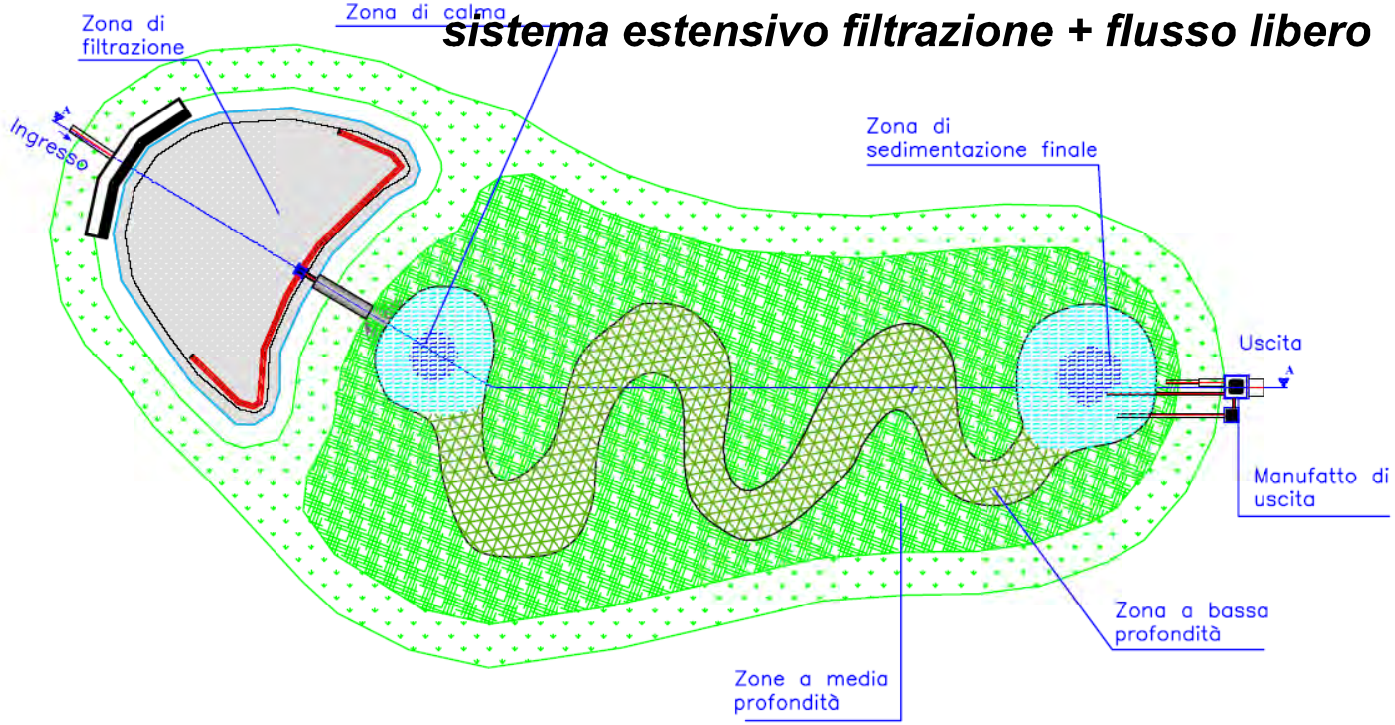
sistema estensivo di filtrazione vegetato



sistema estensivo a flusso libero



sistema estensivo filtrazione + flusso libero



http://www.openness-project.eu


Thanks for your attention
Contact: masi@iridra.com