

Modelli di dispersione: acqua

Equazioni di conservazione

Continuità acqua:

$$\frac{\partial A}{\partial t} = -\frac{\partial Q}{\partial x} + q_{ws}$$

Quantità di moto acqua:

$$\frac{\partial Q}{\partial t} = -\frac{\partial}{\partial x} \left(\frac{Q^2}{A} \right) + gAS_0 - gAS_f - gA \frac{\partial h}{\partial x}$$

Continuità specie trasportate:

$$\frac{\partial VC}{\partial t} = -\frac{\partial QC}{\partial x} dx + \frac{\partial}{\partial x} \left(DA \frac{\partial C}{\partial x} \right) dx + \dot{M}_{ws} + \dot{S}$$

convezione

dispersione

immissione

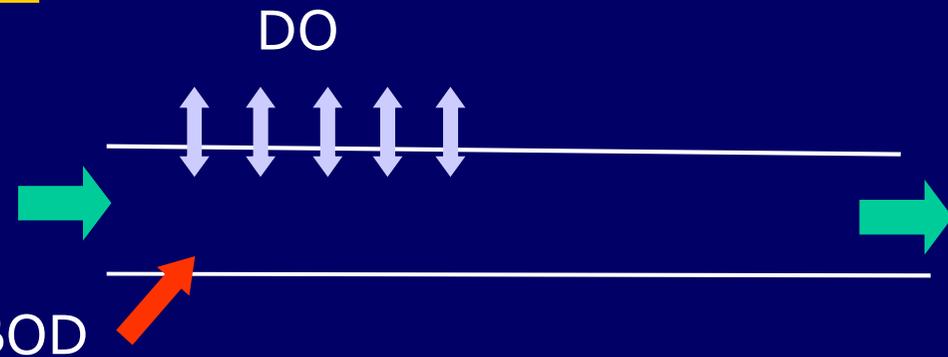
trasformazione

Modelli chimico-biologici

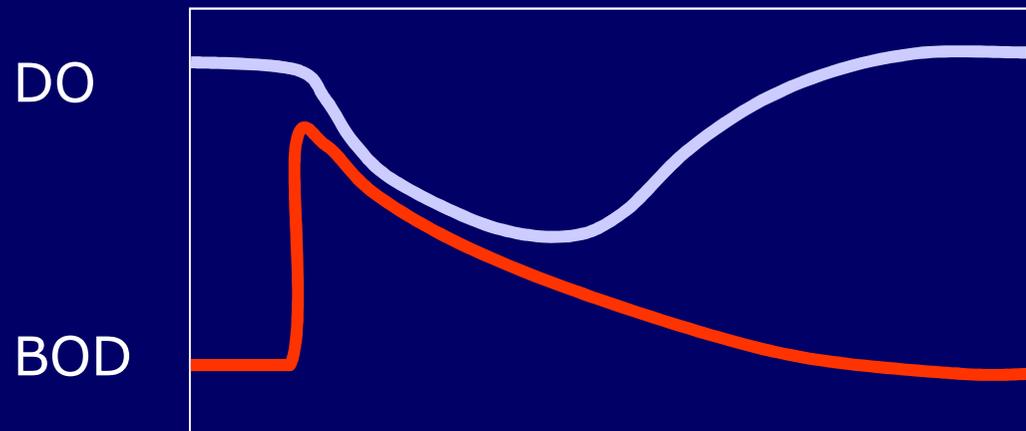
Simulano: Specie non degradabili (es.:cloruri)
Specie degradabili
Ossigeno disciolto
Biochemical Oxygen Demand (BOD)
Alghe
Composti azotati
Composti solfati

Reazione e trasformazione prevalente rispetto al trasporto

Modello di Streeter-Phelps (DO-BOD)



Competizione tra
Reareazione atmosferica
Ossidazione composti



Equazioni di trasformazione

Composti NON degradabili

$$\frac{dR}{dt} = 0$$

Composti degradabili e sedimentabili (BOD)

$$\frac{dL}{dt} = -k_1L - k_3L$$

Composti a interazione complessa (DO)

$$\frac{dO}{dt} = k_2(O^* - O) + (\alpha_3\mu - \alpha_4\rho)A - k_1L - \frac{k_4}{d} - \alpha_5\beta_1N_1 - \alpha_6\beta_2N_2$$

Reareazione
atmosferica

fotosintesi

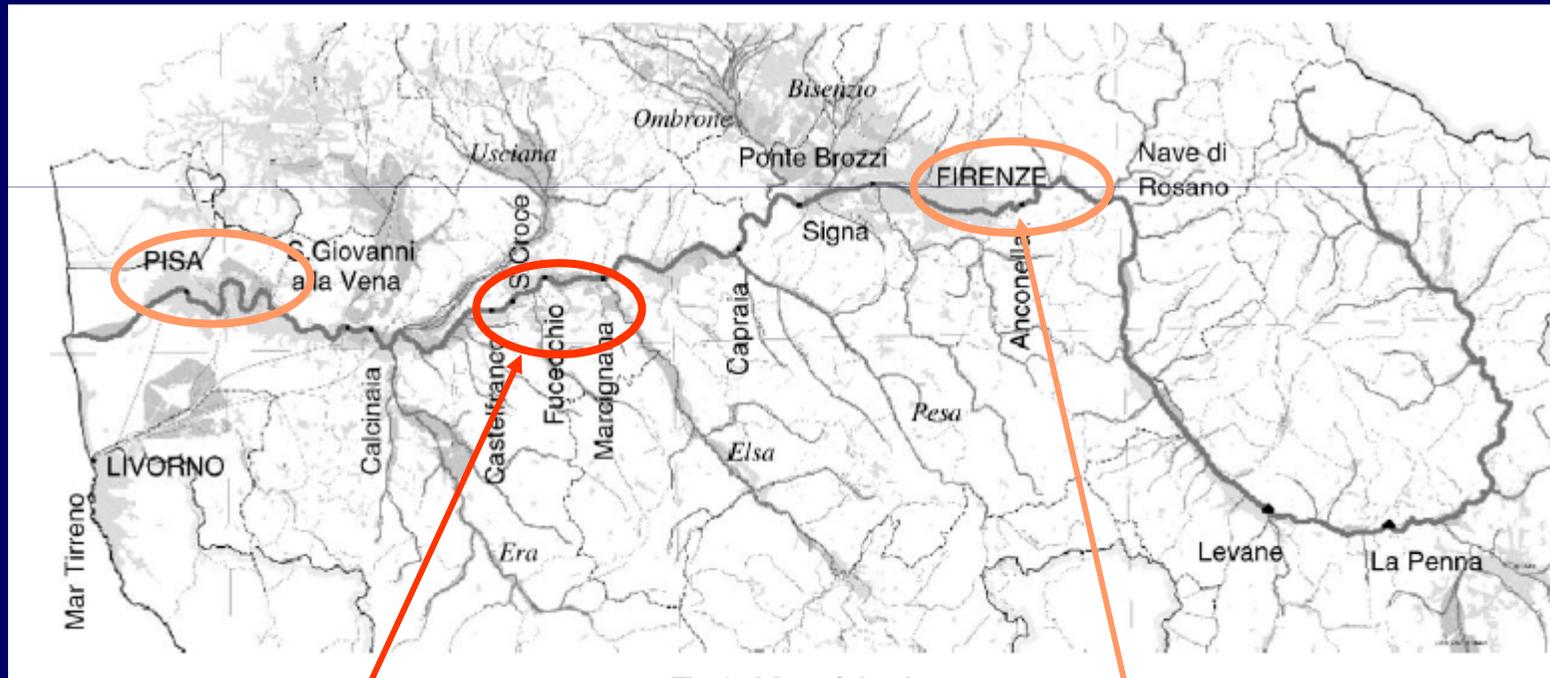
Degradazione
BOD

sedimenti

ossidazione
composti
azotati

Esempio di applicazione

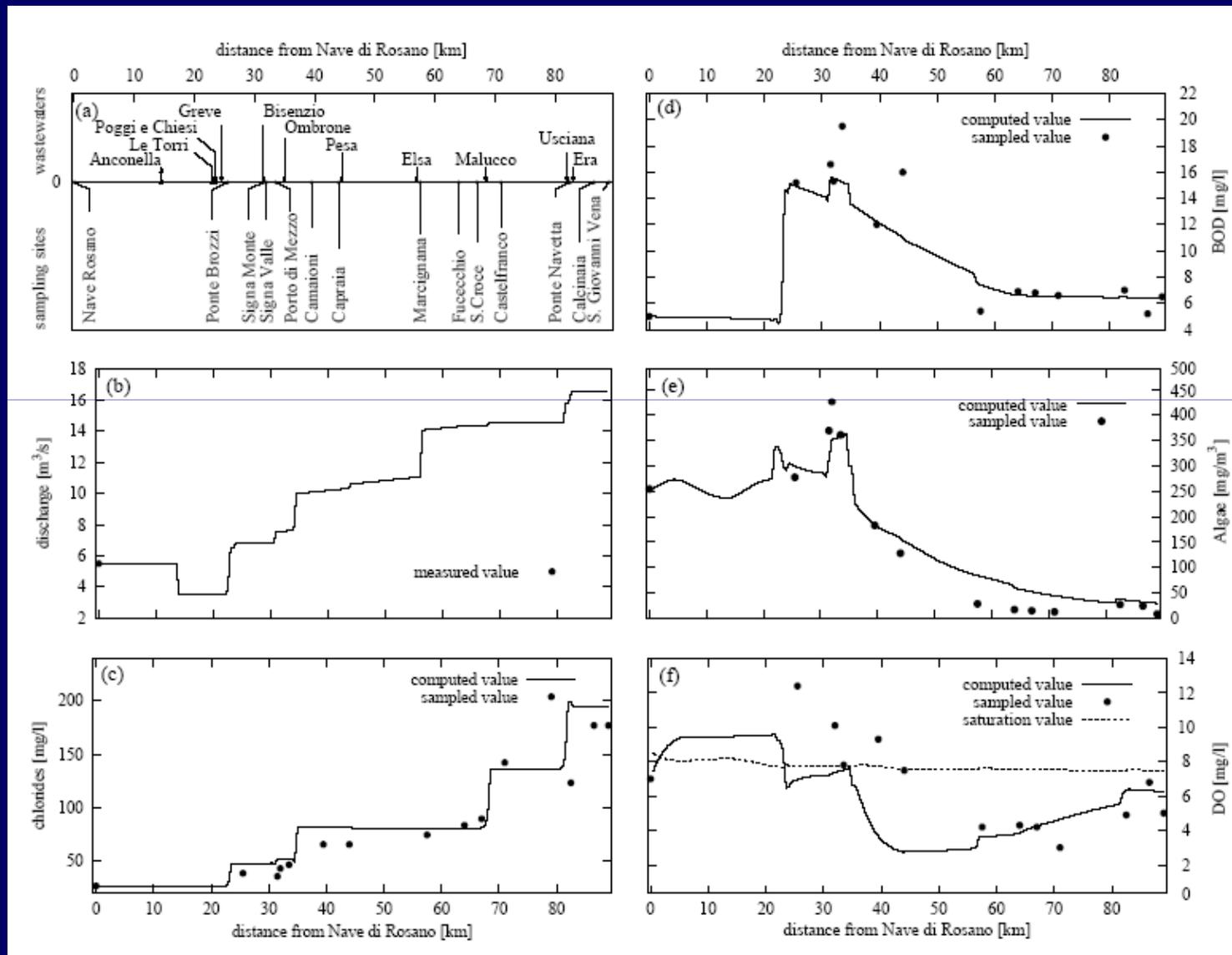
Modellazione qualità acque Arno



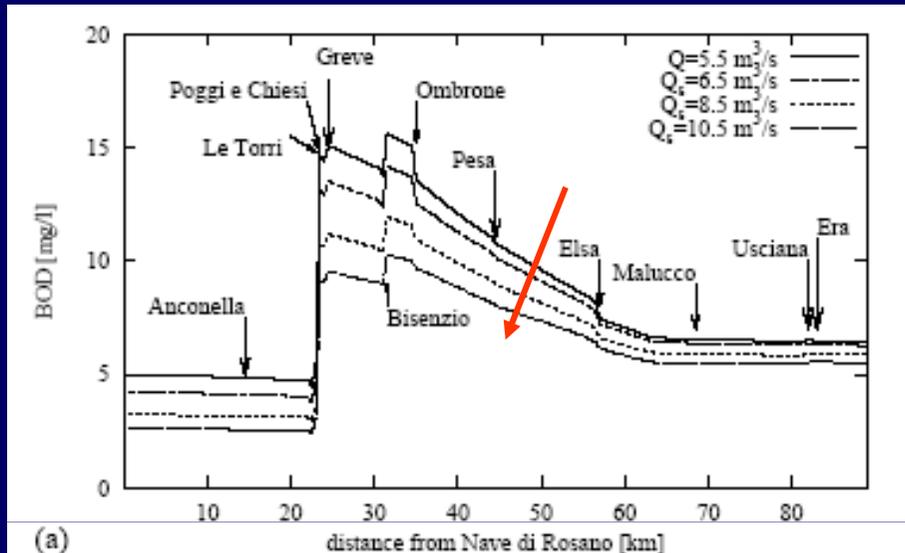
Comprensorio del Cuoio

Scarichi civili

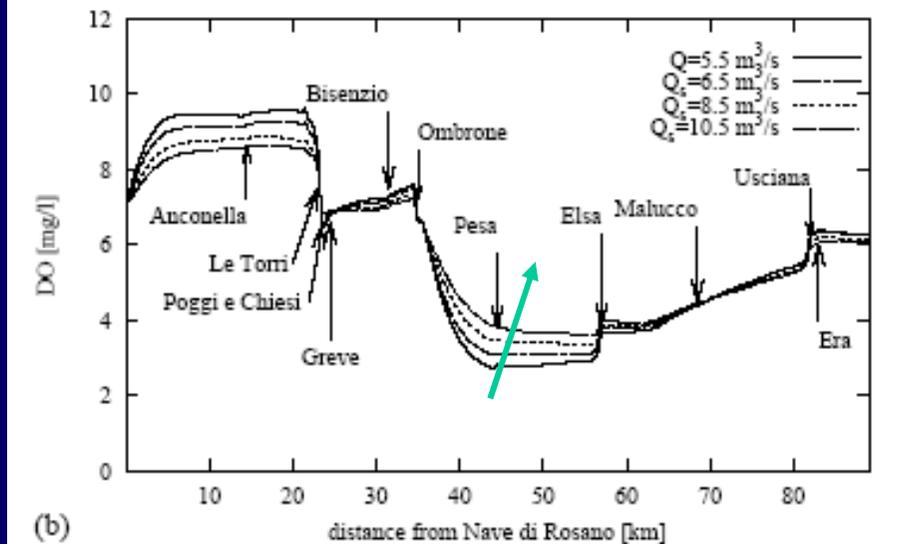
Calibrazione del modello



Modellazione alternativa di gestione



(a)



(b)

Diluizione del carico inquinante con utilizzo degli invasi

Effetto sul livello di ossigeno disciolto

Riferimenti per la modellistica



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Water Quality Models

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Water Quality Models

We provide access to a number of specialized models and tools for water quality managers.

Provide EPA with feedback on the [beta version of a new tool](#) the Agency has developed to help you determine who is discharging wastewater into surface waters, which pollutants they are discharging and how much, and where they are discharging.

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Models

Water quality models are tools for simulating the movement of precipitation and pollutants from the ground surface through pipe and channel networks, storage treatment units and finally to receiving waters. Both single-event and continuous simulation may be performed on catchments having storm sewers and natural drainage, for prediction of flows, stages and pollutant concentrations.

Each water quality model has its own unique purpose and simulation characteristics and the reader is advised to thoroughly review downloading and data input instructions for each model.

- [AQUATOX: A Simulation Model for Aquatic](#)

Tools

Water quality tools include maps and methods.

- [Allocating Loads and Wasteloads](#)—Use this tool for TMDL development.
- [Analytical Methods](#)
Methods used by industries and municipalities to analyze the chemical and biological components of wastewater, drinking water, sediment, and other environmental samples.
- [BASINS: A Powerful Tool for Managing Watersheds](#)
A multi-purpose environmental analysis system that integrates a geographical information system (GIS), national watershed data, and environmental assessment and modeling tools into one.