

Updated: 23 October 2017

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CEE 577: Surface Water Quality Modeling

Lecture #11_a
(Distributed Systems)
Chapra, L9 (cont.)

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Distributed Sources

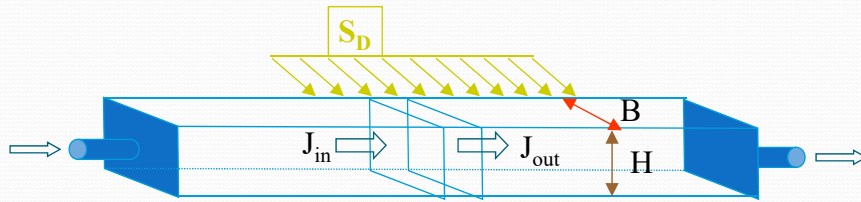
- Source (or sink) that is spread out along the stream length
 - classical non-point sources
 - agricultural, urban runoff
 - Sediment processes
 - sediment oxygen demand
 - Atmospheric deposition

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Distributed source in PFR @SS

$$0 = -U \frac{dc}{dx} - kc + S_D$$

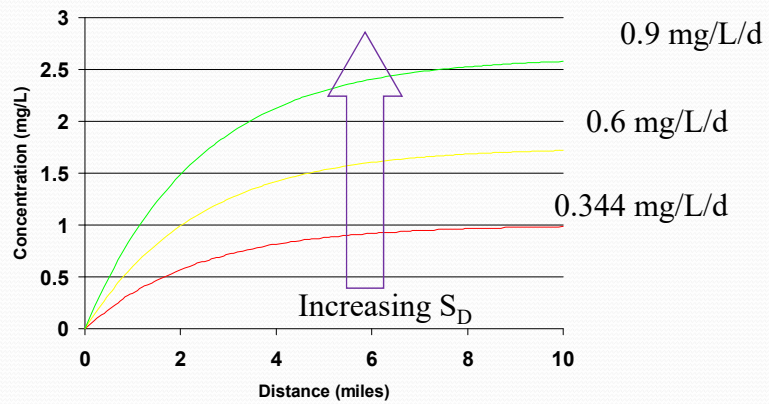
$$c = c_o e^{-k(x/u)} + \frac{S_D}{k} (1 - e^{-k(x/u)})$$



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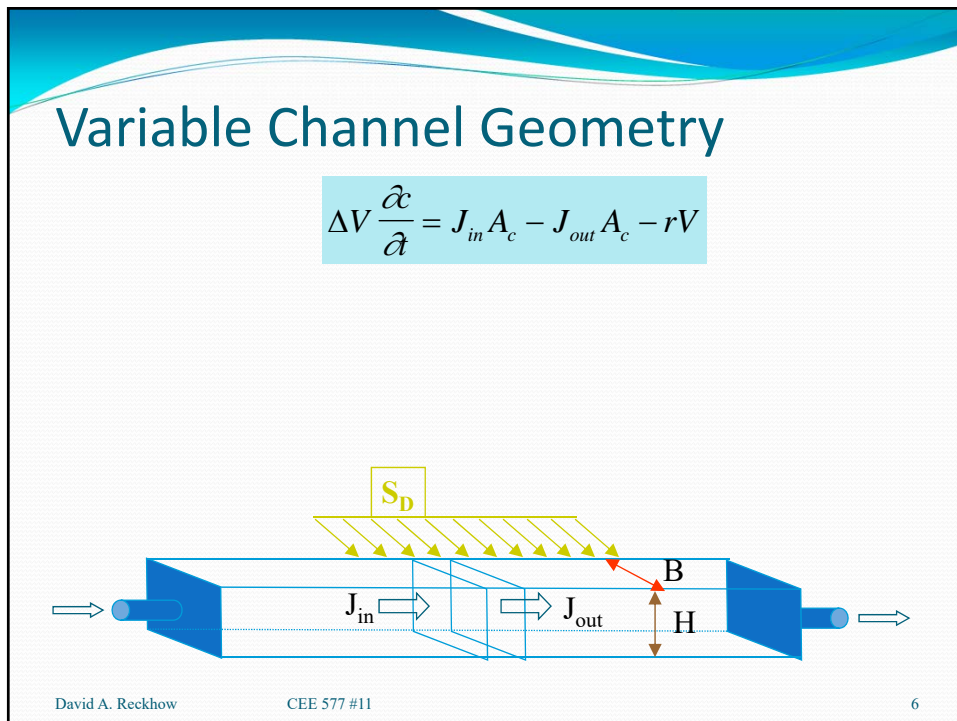
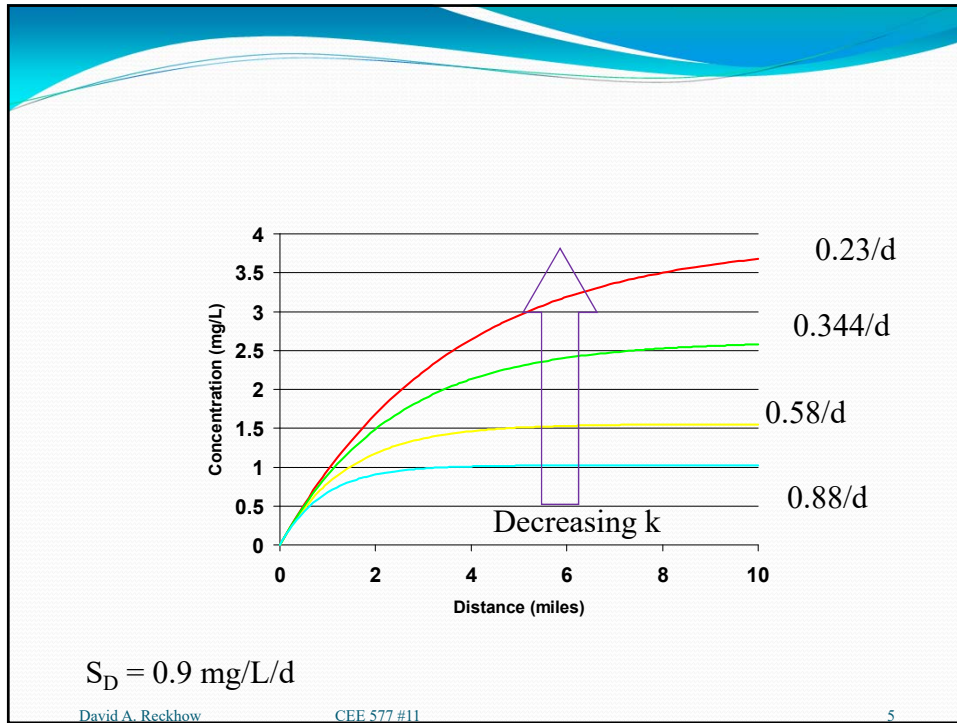


$$K=0.344/d$$

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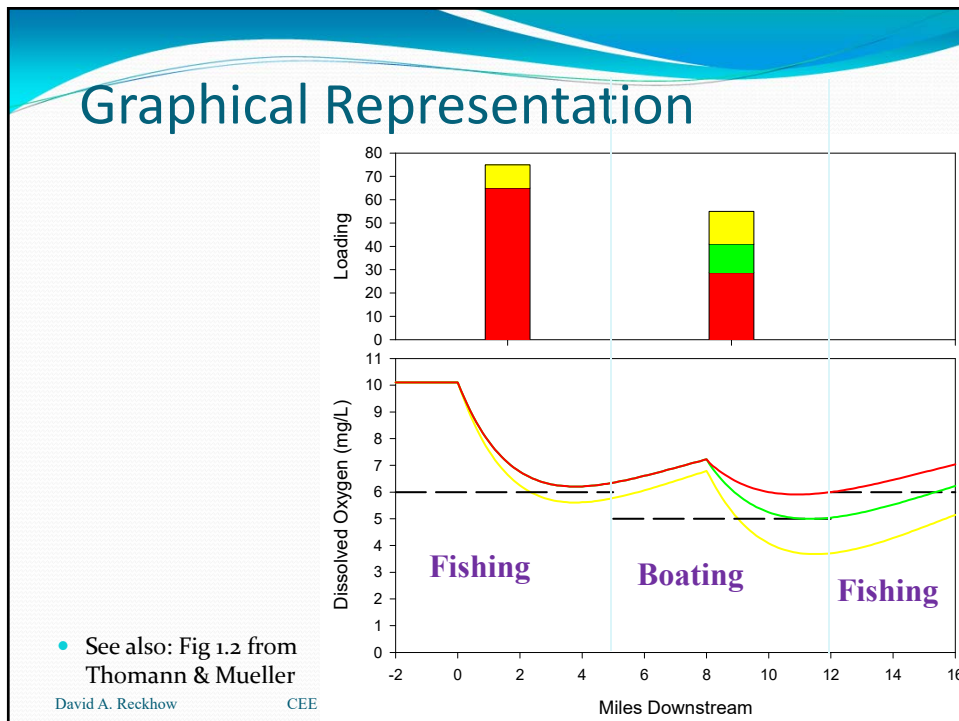


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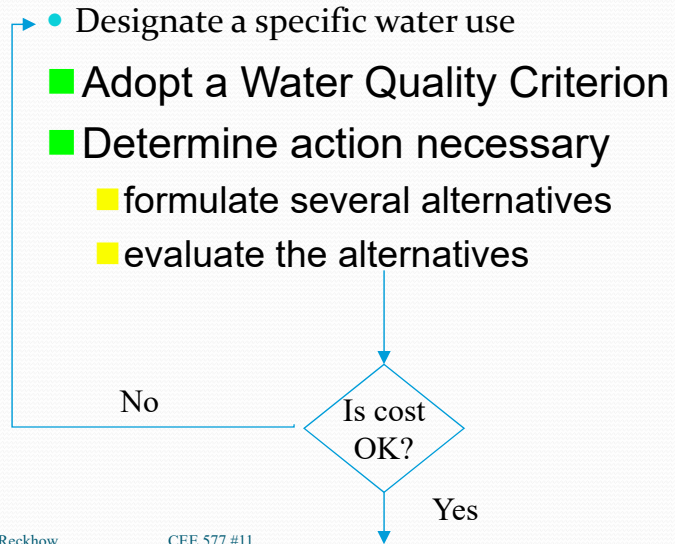
CEE 577: Surface Water Quality Modeling

Lecture #11_b
(Waste Load Allocations)
Chapra, here and there

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WLA: Step by Step



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WLA: breakdown of steps

- Designate a specific water use
 - recreation: swimming, boating, aesthetics
 - water supply: municipal, industrial
 - agriculture
 - fisheries: commercial or sport
 - ecological balance
- Adopt a Water Quality Criterion
 - must support the above use
 - EPA “red book”

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WLA: breakdown of steps

- Determine the action necessary to meet criterion: usually a discharge or effluent Water Quality Standard (enforceable)
 - Formulation of several engineering alternatives to meet the WQC
 - choose *model*
 - collect data
 - *calibrate* model
 - *verify* model
 - sensitivity analysis
 - model run under design conditions
 - alter waste loads and re-run model

- To next lecture