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Water Resources Systems Analysis Reading Assignments

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Read the articles referenced below and answer the following questions:

- A. Linear Programming: Needham et al. 2000
- B. Linear Programming and Sensitivity Analysis: Lund 1990
- C. Dynamic Programming: Allen and Bridgeman 1986
- D. Non-Linear Programming: Stafford et al. 2015
- E. Genetic Algorithm: Perez-Pedini et al. 2005

- 1) Describe in your own words what is the problem that is being addressed? Why is it important?
- 2) What system is being modeled? Identify the system boundaries, processes, inputs and outputs.
- 3) How the system is being modeled? Identify the main state variables, parameters, initial conditions and boundary conditions.
- 4) What is the optimization method used to solve the problem. Describe the method.
- 5) What are the objective functions, constraints and decision variables?
- 6) What are the main conclusions and insights generated by the use of optimization? Analyze critically the methodology, identifying limitations and weaknesses and provide suggestions to better address the problem.

References

- Allen, R. B., and Bridgeman, S. G. (1986). "Dynamic Programming in Hydropower Scheduling." *Journal of Water Resources Planning and Management*, 112(3), 339-353.
- Lund, J. R. (1990). "Least-Cost Scheduling of Solid Waste Recycling." *Journal of Environmental Engineering*, 116(1), 182-197.
- Needham, J. T., Watkins, D. W., Lund, J. R., and Nanda, S. K. (2000). "Linear Programming for Flood Control in the Iowa and Des Moines Rivers." *Journal of Water Resources Planning and Management*, 126(3), 118-127.
- Perez-Pedini, C., Limbrunner, J. F., and Vogel, R. M. (2005). "Optimal Location of Infiltration-Based Best Management Practices for Storm Water Management." *Journal of Water Resources Planning and Management*, 131(6), 441-448.
- Stafford, N., Che, D., and Mays, L. W. (2015). "Optimization Model for the Design of Infiltration Basins." *Water Resources Management*, 29(8), 2789-2804.