

Course syllabus

Department of Civil Engineering, Indian Institute of Technology Madras

CE5016 - Sustainability in River Basin Management

Credit Distribution: C:9 L:3 T:0 P:0 E:0 O:6 TH:0

Course Type: Theory

Description: NIL.

Course Content: The course will be structured in five major parts: (1) Concepts of sustainability - including historical and theoretical background, challenges in defining sustainability as well as local, regional and global aspects (scale problem) (2) Natural water resources - including the water cycle and its components, regional differences (with examples from India and Europe), measuring water components and data availability (3) Status and challenges regarding sustainability and river basin management rising water demand vs. decreasing per capita resource, water and poverty, governance and finance, pollution and water related diseases, water and land use / land management, dams and diversions, trading water real and virtual, hydrological change following global climate change, interactions between hydrology and climate (4) Towards sustainability in river basin management - cutting demand, increasing supplies, protecting water resources / improving water quality, case studies (from India and Europe), improved monitoring and data management, develop catchment management plans, decision support systems as interdisciplinary basis for sustainable management (5) How to evaluate sustainability in river basin management? - Defining goals / dealing with trade-offs, available indices of sustainability, model-based evaluations of sustainability.

Text Books

- Jones, J. A. A. 2010. Water sustainability - a global perspective. Hodder Education: London.
- Loucks, D.P. Gladwel, J.S.1999. Sustainability criteria for water resource systems. Cambridge University Press: Cambridge.
- Selection of recent and fundamental journal articles (available as pdf) Allouche, J. 2011.
- The sustainability and resilience of global water and food systems: Political analysis of the interplay between security, resource scarcity, political systems and global trade. Food Policy 36, Supplement 1: S3-S8. Bithas, K. 2008.
- The sustainable residential water use: Sustainability, efficiency and social equity. The European experience. Ecological Economics 68: 221-229. Chung, E.-S. & Lee, K. S. 2009.
- Prioritization of water management for sustainability using hydrologic simulation model and multi criteria decision making techniques. Journal of Environmental Management 90: 1502-1511. Cocklin, C. & Blunden, G. 1998.
- Sustainability, water resources and regulation. Geoforum 29: 51-68. Fiorillo, F., Palestrini, A., Polidori, P., & Soggi, C. 2007.
- Modelling water policies with sustainability constraints: A dynamic accounting analysis. Ecological Economics 63: 392-402. Hoko, Z. & Hertle, J. 2006.
- An evaluation of the sustainability of a rural water rehabilitation project in Zimbabwe. Physics and Chemistry of the Earth, Parts A/B/C 31: 699-706. Iglesias, A. & Buono, F. 2009.

- Towards sustainability of water policies in Mediterranean countries: evaluation approaches in the SWAP project. *Current Opinion in Environmental Sustainability* 1: 133-140. Li, Y. & Yang, Z. F. 2011.
- Quantifying the sustainability of water use systems: Calculating the balance between network efficiency and resilience. *Ecological Modelling* 222: 1771-1780. Popp, J., Hoag, D., & Hyatt, D. E. 2001.
- Sustainability indices with multiple objectives. *Ecological Indicators* 1: 37-47. Singh, A. 2010.
- Decision support for on-farm water management and long-term agricultural sustainability in a semi-arid region of India. *Journal of Hydrology* 391: 63-79. Tyson, J. M. 1995.
- Quo vadis - sustainability? *Water Science and Technology* 32: 1-5. Wood, W. W. 2003. *Water Sustainability: Science or Science Fiction? Perspective from One Scientist*.
- In *Water Resources Perspectives: Evaluation, Management and Policy*, Wood WW, Alsharahn AS (eds). Elsevier: Amsterdam; 45-51. Richard O Gilbert (1987). *Statistical methods for environmental pollution monitoring*, John Wiley & Sons.

Reference Books: NIL

Prerequisite: NIL