



MSc module WATER RESOURCE MANAGEMENT (P00729)

SEMESTER 1

Course Organiser:

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Other Contributors:

Dr. Neil Stuart (School of GeoSciences)

Course aims:

To provide a practical grounding in different approaches to managing water resources within the catchment context. The course includes engineering and land management approaches and also examines the role of hydrological modelling in water resource management. Topics will be covered through case-studies and a field visit.

Programme:

All sessions will be held in the Crew Annexe on Wednesday mornings, apart from where indicated.

Week 1: Water as a resource (KH)

- Introduction to the physical basis of water resources: hydrological cycle at global and catchment scales; stores and fluxes in the catchment hydrological system (precipitation, interception, stemflow, throughfall, infiltration, soil moisture, groundwater, properties of good and poor aquifers, how water reaches river channels, storm hydrographs, measuring river flow)
- The nature of demands for water resources (domestic, industrial, agriculture, HEP, navigation, recreation, habitat conservation, freedom from flooding).
- The difficulties in matching supply and demand and the role of the environmental manager.

Week 2: Flooding and flood control (KH)

- Causes of flooding
- Approaches to combating flooding: planning vs flood defences
- Case-study of Mississippi floods

Week 3: Water resources planning, management and conflicts - a global perspective (KH)

Week 4: Control approaches to water management - engineering (reservoirs, groundwater, HEP) (KH)

- Reservoirs: site selection; multiple uses of reservoirs (water supply, flood control, recreation, HEP); operation; impacts.
- Aquifers: selection; problems of overabstraction e.g. saline intrusion; artificial recharge to remedy overabstraction.
- Multiple water resource use; interbasin transfer.

Week 5: GIS applications in water resource management (NS)

- Introduction to GIS: definition; characteristics; data structure in GIS; digital elevation models.
- GIS applications: parameter estimates in models; simulations; integrating data; encouraging participation.
- E.g. of application in flood prediction in London.

Week 6: Catchment management and introduction to field visit (KH)

- Catchment management: processes; examples of catchment management; EU Water Framework Directive.
- Background to the River Almond catchment.

Week 7: Feedback on poster plan (KH)

Week 8: Field visit to West Lothian – catchment management in the River Almond (KH) ALL DAY

- An overview of major issues in the River Almond catchment: mine water pollution, sustainable urban drainage, amenity value of water.
- A packed lunch, walking boots, and warm waterproof clothing should be brought.

Week 9: Catchment management poster conference and assessment (KH)

- Presentation of assessed posters: comparing and contrasting catchment management in two different catchments
- Question and discussion sessions

Week 10: Control approaches to water management - land management (forestry, drainage). (KH)

- Quantifying water resources: water yield, probability of flows occurring (flow duration curves, return periods of floods and droughts).
- Factors affecting water yield and flows and the influence of land use and management on these.
- Effects of forest cover on catchment water yield and flows (planting and harvesting); solutions.
- Effects of land drainage for agriculture on storm flows.
- Effects of urbanisation on catchment water yield and flows; solutions.

Week 11: No class

Exam in December exam period

Assessment:

50 % coursework –

- 10 % plan for assessed poster (see below) Max 1000 words.
- 40 % poster presentation comparing and contrasting catchment management in two different catchments. The poster will be presented in a 15-20 minute presentation at the poster conference on 16th November. The assessment will include the poster, the oral presentation and asking and answering questions. An electronic version of the poster should also be submitted to Kate Heal at the poster conference.

50 % exam – 2 hour closed book exam (1 hour short-answer questions, 1 hour essay) in the December exam period.

Recommended reading:

There is no textbook that covers the whole course. The following is the most relevant book currently available:

Newson, M. (1997). *Land, Water and Development (2nd Edition)*. [1st and 2nd editions both available in University Library. Either edition is acceptable.]

Newson, M. (1994). *Hydrology and the River Environment*. An introductory hydrology text for those who have not studied hydrology before. [Out of print but copies available in the University Library.]

Jones, J.A.A. (1997). *Global Hydrology: Processes, resources and environmental management*. A more in-depth hydrology textbook for those who have not studied hydrology before. [Should be available in Blackwells Booksellers. Copies available in the University Library.]

More detailed reading lists will be handed out each week.

Useful WWW sites (needs updating):

<http://www.therrc.co.uk> (River Restoration Centre – information on demonstration sites)

<http://www.cwp.org/> (Center for Watershed Protection – one of the main US agencies involved in catchment management)

<http://www.ciria.org.uk/suds/index.html> (CIRIA (Construction Industry Research and Information Association) website on Sustainable Urban Drainage Systems (SUDS) in the UK)

<http://www.sepa.org.uk/wfd/index.htm> and

<http://www.sepa.org.uk/publications/wfd/index.htm>

(Information on the progress of the EU Water Framework Directive from the Scottish Environment Protection Agency (SEPA) website – many useful links)

<http://www.scotland.gov.uk/Topics/Environment/Water/17316/9088> (Scottish Executive website on implementation of the EU Water Framework Directive in Scotland)