

# Water Resource Management [PGGE11018]

**20 credits, Semester 2, 2015/16**

## Course Organiser

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## Course Secretary

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## Course aims

The course aims to enhance understanding of the multiple, multi-scale interconnections between water management, environmental and socioeconomic issues. In particular, it considers multidisciplinary approaches to water management problems. Examples and case studies will be used to illustrate the issues surrounding water management, drawing on perspectives from both the natural and social sciences.

## Learning objectives:

- To understand the theory and practice of water management at the international, national and local contexts and its multiple connections with environmental issues;
- To understand hydrological, socioeconomic and environmental aspects of water management;
- To apply critical thinking to case studies related to water management and development in Northern and Southern countries.

## Assessment

The course is assessed by an essay (50%) and group project work (50%):

- 2,500-word essay due by <to be decided> (50% of course mark):  
“Examine, making use of water-related examples and case studies, the implementation of regulatory frameworks (e.g. EU Water Framework Directive) or scientific-technological approaches (e.g. equipment or decision-making tools) for water management. Your essay should clearly describe the purpose, the rationale, the results and the difficulties faced (e.g. from socioeconomic, environmental, technical and/or institutional perspectives).”
- Project work in groups of 3 or 4 students; assessment by group presentation to class (25% of course mark) and individual 1,500-word essay, due by <to be decided> (25% of course mark):  
“Discuss achievements and failures of water data management (qualitative and quantitative data) and/or of the introduction of economic instruments for water management (e.g. charges, incentives, payment for ecosystem services, water markets, etc.) in a river basin of your choice.”

The *Learn* ‘virtual learning environment’ will be used for electronic submission of essays. The *Turnitin* software system will be used to scan each essay to detect any plagiarism.

## Programme

All sessions will be held in the Crew Building Annexe, Room 4, 14:00-18:00 on Tuesdays. The Crew Building Annexe is a single storey suite of class rooms immediately to the north of the Crew Building. The location of the Crew Building is shown at: <http://www.ed.ac.uk/maps/buildings/crew-building>.

<b>FIRST MEETING: 14:00-17:30 Tuesday 12 January 2016, Room 4, Crew Building Annexe</b>
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<b>Date</b>	<b>Time</b>	<b>Title and description</b>
12 Jan	14.00–14.30	Simon Allen (Course Organiser, School of GeoSciences) <b>Introduction to the course</b> Simon will introduce the aims and intended learning outcomes of the course. He will also introduce the course assessments and review the contents of the programme.
	14.30–17.30	Martin Griffiths (Director of Pillon Ltd – Independent Water and Environmental Consultant) <b>Water Strategy, Planning and Delivery – The Water Framework Directive</b> Martin will introduce the management of water resources, picking up the key elements of water strategy, planning and water quality protection and improvement. The EU Water Framework Directive will be used to demonstrate these principles in action and to show how they have been implemented in the UK and across Europe. Use will be made of international examples to show the potential for application in river basins across the world.
19 Jan	14.00–17.00	Janet Fisher (Chancellor's Fellow, School of GeoSciences) <b>Market environmentalism and the governance of water</b> Janet will examine water governance, noting that many contemporary water governance initiatives are conceived within a frame of market environmentalism, which promotes pricing and the allocation of property rights. Such strategies are often rationalized as a least-cost way of achieving desired environmental goals, but they have various social implications. In this workshop, we will investigate some of the premises of market environmentalism, and examine some market-oriented schemes for water management, including ‘Payment for Ecosystem Services’.
	17.00–17.30	Simon Allen (Course Organiser, School of GeoSciences) <b>Explanation of assessed group project work</b> Simon will explain the arrangements for the group project work, which accounts for 50% of the overall course mark. This will include the formation of groups, selection of topics, the scheduling of group presentations to class and marking criteria.
26 Jan	14.00–17.00	Kate Heal (Senior Lecturer in Water Resources, School of GeoSciences) <b>Water quality monitoring and measurement</b> In this session, Kate will define ‘water quality’, examine standards for water quality and consider how water quality is measured. Material will be covered through lectures encompassing theory and case-studies, a video, and group-work to design programmes for assessing water quality.
	17.00–18.00	Group project work
2 Feb	14.00–17.00	Massimo Bollasina (Lecturer in Atmospheric Sciences, School of GeoSciences) <b>Water and climate</b> Massimo will introduce the global water cycle, explaining the factors that determine variations in the spatial and temporal distribution of rainfall, which can result in extremes of water supply: floods or droughts. He will also review current understanding of how future climate change will affect global patterns of rainfall.
	17.00–18.00	Group project work

<b>Date</b>	<b>Time</b>	<b>Title and description</b>
9 Feb	14.00–17.00	Chris Spray (Professor of Water Science and Policy, UNESCO Centre for Water Law, Policy and Science, University of Dundee) <b>Wetland ecosystem services – or what have rivers and lochs ever done for us?</b> Chris will introduce the concept of ecosystem services, and the rise in what some see as a new paradigm in the way we approach integrated water resource management, including the fundamental role of biodiversity as part of the underlying supporting services upon which others rely. Using examples from the UK National Ecosystem Assessment, along with work currently in progress across Scotland, he will look at the way in which researchers and organisations involved in catchment management are now trying to incorporate ecosystem services into rural and regional planning, and into river basin management. Taking an Ecosystem Approach raises many more challenges than just those associated with ecology and the bio-physical sciences, as it tries to bring the human dimension into play as well.
	17.00–18.00	Group project work
16 Feb	No class	<b>Innovative Learning Week</b>
23 Feb	14.00–17.30	Michael Spencer (PhD Student, School of GeoSciences) <b>Quantifying river flow</b> It is difficult to directly measure flow in streams and rivers! Michael will therefore talk about some of the ways we might derive flow estimates. He will also look at some uses for collected flow data and lead a short workshop on estimating flood flow.
1 Mar	14.00–16.00	Jamie Skinner (Principal Researcher and Water Team Leader, International Institute for Environment and Development) <b>Dams and development in Africa - winners and losers</b> Major rivers flowing through semi-arid countries have long been key to the survival of local people in unpredictable Sahelian or desert environments. Climate change variability and increasing energy demands have led to a recent surge in large dam projects throughout Africa and these projects have the capacity to significantly alter natural flows. Their costs and benefits are not equally distributed, either up and downstream, or between traditional local water users (fishermen, herders, farmers, etc) and electricity consumers. Using examples from the Nile and Niger basins, the session will discuss the challenges facing the sharing of water and its benefits between countries and between users.
	16.30–17.30	Student group presentations (2 groups, 30 minutes each)
8 Mar	14.00–16.00	Fiona McLay (Senior Scientist in Flood Modelling, Scottish Environment Protection Agency) [ <i>To be confirmed</i> ] <b>Flood risk management in Scotland</b> Flooding is currently a “hot topic” following the flood events in Scotland and northern England this winter. Fiona will introduce the many factors influencing flooding in the UK, from climate to land use, and explain how flood risk management is co-ordinated in Scotland. She will explain the new approach introduced by the EU Flood Directive and Flood Risk Management (Scotland) Act and also explain how SEPA’s flood warning service operates.
	16.30–17.30	Student group presentations (2 groups, 30 minutes each)

<b>Date</b>	<b>Time</b>	<b>Title and description</b>
15 Mar	14.00–16.00	<p>Martin Pullinger (Post-Doctoral Research Assistant, School of Informatics)</p> <p><b>Understanding and influencing household water demand in the UK</b></p> <p>Household water use accounts for over 50% of UK water demand, unlike many countries where agriculture and industry use the majority. However, we understand surprisingly little about the drivers of that demand, and what people are actually doing with the water, which limits the industry’s ability to forecast future demand and encourage reduced water use in the home. Martin will present an overview of social science approaches to understanding and attempting to influence household water demand, from behavioural economics to theories of social practice, with discussion of their relative strengths and weaknesses and a look at their implications for effective water demand management.</p>
	16.30–17.30	Student group presentations (2 groups, 30 minutes each)
22 Mar	14.00–18.00	<p>Martin Griffiths (Director of Pillon Ltd – Independent Water and Environmental Consultant)</p> <p><b>Water Regulation and Permitting – How to ensure water quality outcomes</b></p> <p>Martin will make the case for strong but proportionate regulation of water resources to drive water protection and improvement, and to ensure equitable use of water. He will examine the regulatory cycle as a template for setting permits to ensure agreed outcomes in the water environment. This will include an overview of permit legislation, setting permits, compliance assessment and enforcement. Examples from the UK and China will be used to demonstrate actual processes, investigate gaps and seek improvement. Martin will also touch on how permits are used to drive investment programmes and take a forward look to new approaches through the development of Modern Regulation programmes.</p>
29 Mar	14.00–16.00	<p>Hugh Chalmers (Tweed Foundation)</p> <p><b>Visit to Eddleston Water Project</b></p> <p>Hugh will lead a visit to locations within the catchment of the Eddleston Water, to see natural flood management measures, which are being implemented to reduce the flood risk to houses and businesses in Peebles, at the bottom of the catchment, where the Eddleston Water joins the River Tweed. The measures implemented include extensive riparian tree planting, re-meandering of the river channel, ‘leaky pond’ creation and installation of high flow restrictors. As well as mitigating flood risk, these measures will also help to enhance biodiversity within the catchment. The <a href="#">project</a> is being delivered by a partnership of local and national organisations, coordinated by the Tweed Forum.</p>

### **Reading**

There is no textbook that covers the whole course. A specific reading list will therefore be provided each week. Wherever possible, readings will be made available to students online, via the web-based ‘virtual learning environment’ *Learn*.