Integrated Catchment Management	
Module Ref No:	
Date of Validation:	**2020**
SCQF Level:	**9**
SCQF Credits:	**15**

1. Rationale
Water resources are under increasing pressure from a wide range of pressures such as pollution and climate change, as well as the demands of multiple stakeholders (including, industry, agriculture, forestry, conservation, fisheries and power supply).. Sustainable development and effective management of these resources are best carried out at a catchment or river basin scale, with all users' demands and effects on the water resource taken into account. This module will explore the physical, chemical and ecological characteristics of catchments, illustrate the conflicting demands for land and water use and the impact of land and water users. It will seek to identify technical, planning and educational tools for effective integrated management within the context of the requirements of the Water Framework Directive.

2. Learning Outcomes	
At the conclusion of this module the student should be able to:	
LO1:	Explain the factors that influence the hydrological, morphological and ecological characteristics of river basins.
LO2:	Investigate threats to water quality and quantity and the main mitigation/control methods
LO3:	Evaluate the effectiveness of integrated catchment management

3. Content	
3.1	**Characteristics of river basins** The relationship between hydrology and ecology. Water, sediment and pollutant transport; channel morphology, river flow; nutrient and organic matter cycling and eutrophication; aquatic food webs. Water quality and good ecological status. Discussion should include rivers, lakes, groundwater.
3.2	**Requirements and constraints** Description and analysis of main stakeholders and their activities. Economic interests and the legal framework for regulation: The Water Framework Directive; multi-criteria decision making.
3.3	**threats to water quality and quantity and techniques for control and mitigation** Potential impacts from point, nd diffuse pollutants. Pollution control and mitigation measures. Techniques for control of flow. Measures discussed might include agri-environment schemes, flood risk assessment and control measures, sustainable flood management, abstraction control, impoundment, discharge consents, advanced sewage and wastewater treatment, constructed wetlands, buffer strips, best management practice guidance, legislation.
3.4	**Effectiveness of integrated catchment management** Case studies of integrated catchment management could be taken from Scotland, Europe and the developing world. Consideration of regulatory and legislative control, catchment management plans, educational/awareness programmes. Assessment of multiple benefits of integrated management towards sustainable development

4. Approaches to Learning and Teaching	
Notional Study Hours: Typically, students will have to undertake about **150 hrs** of study to successfully achieve the learning outcomes for this module; this will be made up of a combination of both scheduled and independent study as indicated below.	
Scheduled Study: Typically consisting of:	**35 h**
Lecture – including webcast/interactive digital content	26
External visits	7
Tutorial	2
Independent Study:	**115 hrs**

5. Graduate Attributes	
Opportunity to develop the following aspects of graduate attributes will be included within this module:	
Graduate Attribute	**Learning Activity and Aspect Developed:** Case study and poster presentation:
1. Academically competent	• By engaging in individual research a breadth and depth of knowledge, understanding and skills of their chosen subject will be developed. • By discussion in class a recognition of informed argument and debate as means of challenging accepted knowledge and understanding; • By completing a range of different assessments an ability to communicate effectively for different purposes and in different contexts will be developed
2. Critical thinker	• By undertaking individual additional research a capacity for independent and creative thinking will be developed; • By collecting, synthesising and analysing information in a reasoned manner.
3. Desire for learning and personal development	• an openness to, and an interest in, lifelong learning through both directed and independent study.
4. Responsible member of society	• By exploring a range of related topics students will further their understanding of the global responsibilities and issues within their chosen subject area; • By class discussion a responsible attitude to ethical and environmental issues will be encouraged;
5. Employability	• By undertaking the assessments which have a blended theory and applied design the students will continue to develop an international perspective of relevant policies and practice and the ability to understand business and their approach to the environment.

6. Assessment

This module will be assessed using the following methods:

Assessment Method	Contribution to Grade (%)	Nature of Assessment
Poster or oral presentation	**30%**	The student will de\liver **either** an A3 poster and 500 word handout **or** a 15 minute presentation based on a specific issue within a river catchment.
Case Study Report	**70%**	The student will undertake a 3000 word case study report of a multiple land use catchment

7. Reading

Required: the following texts are general subject texts– each subject area covered in lectures has its own literature on Moodle – lecturers will indicate in advance of class which resources are required reading for that semester.

Perfect, C., Addy, S. and Gilvear, D. (2013), The Scottish Rivers Handbook: A guide to the physical character of Scotland's rivers, CREW project number C203002. Available online at: https://www.crew.ac.uk/publication/scottish-rivers-handbook

SEPA (2015) The river basin management plan for the Scotland river basin district: 2015–2027. SEPA, Stirling. Available online at: https://www.sepa.org.uk/environment/water/river-basin-management-planning/the-current-plans/

SEPA (2016) Natural flood management handbook. SEPA, Stirling. Available online at: https://www.sepa.org.uk/media/163560/sepa-natural-flood-management-handbook1.pdf

SEPA (2019) The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended): A Practical Guide. SEPA, Stirling. Available online at: https://www.sepa.org.uk/media/34761/car_a_practical_guide.pdf

The River Restoration Centre (2013) Manual of river restoration techniques. Available online at: https://www.therrc.co.uk/manual-river-restoration-techniques

Students will also be referred to current legislation, and scientific and technical publications as appropriate via Moodle

Additional:

Forestry Commission (2017) UK Forestry Standard. Forestry Commission, Edinburgh. Available online at: https://www.gov.uk/government/publications/the-uk-forestry-standard

Nisbet, T., Silgram, M., Shah, N., Morrow, K. & Broadmeadow, S. (2011) Woodland for Water: Woodland measures for meeting Water Framework Directive objectives. *Forest Research Monograph*, **4**, Forest Research, Surrey. Available online at: https://www.forestresearch.gov.uk/research/forest-hydrology/woodland-for-water-woodland-measures-for-meeting-water-framework-directive-objectives/

Scottish Executive (2005) Prevention of Environmental Pollution from Agricultural Activity (PEPFAA): a code of good practice. Scottish Executive, Edinburgh. Available online at: https://www.gov.scot/policies/agriculture-and-the-environment/pepfaa/

Scottish Government (2019) Hydro nation strategy. Available online at: https://www.gov.scot/policies/water/hydro-nation/

8. Staff

Module Leader:	John McDonald (Aberdeen) Cath Seeds (Ayr) Laura McGowan (Edinburgh)