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Engineers vs the environment: the case for ecosystem services in university education

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Abstract: The concept of ecosystems services provides a powerful framework for education and environmental decision-making. Engineers have an important role to play in the sustainable management of ecosystem services, since engineers design, operate and maintain the processes, infrastructure and equipment which have the potential to damage or destroy environmental systems. However, while sustainability is a concept embraced by professional engineering organisations and taught (in some form) in all reputable engineering degrees, the concept of ecosystem services is not widely known or accepted within the profession, and therefore not considered to be a core part of engineering education. In this study, we developed a new environmental engineering course framed around the concepts of planetary boundaries and ecosystem services. The course involved quantitative calculations, systems thinking and a visit to both artificial and natural ecosystems. The students were introduced to different methods of valuing ecosystem services, and the limitations and advantages of green infrastructure. 60 % of students identified the concept of ecosystem services as one of their key learnings from the course, and concluded it was an important communication and decision-making tool for engineers. Our field trip to a local coastal ecosystem was identified by many students as a turning point in their understanding of ecosystem services. Since the concept of ecosystem services underpins many of the core elements of sustainability, we argue that it should be included in engineering curriculum. Field trips which give students the opportunity to observe ecosystem services can help make this happen.

Keywords: *ecosystem services; engineers; education; sustainability*