



Evaluating the downstream consequences of agriculture in a rural river-estuary system

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Estuaries are depositional environments and their natural evolution is characterised by progressive infilling by terrestrial and marine sediments. Many estuaries in southwest England, however, have exhibited increased sedimentation rates in recent times. The Devonshire Avon is one such example where navigational problems and siltation of oyster beds may signal a recent increase in sedimentation rates in the estuary. A multi-disciplinary study was conducted to test this hypothesis, using sediment-fingerprinting techniques, sedimentology, micropalaeontology and ^{210}Pb and ^{137}Cs dating. It was found that both marine and terrestrial sediments contribute to the estuarine sedimentation. The marine infill processes in the lower estuary are very much in line with the flood-dominant status of the shallow estuarine mouth and the sedimentation rates are not unusual. On the other hand, the siltation of the upper estuary is occurring at an accelerated rate, with sedimentation rates having doubled since 1970 based on stratigraphic records from salt marshes. Sediment finger-printing using mineral magnetic tracers revealed that a large proportion (66%) of the fine sediment deposited delivered to the upper estuary is derived from arable land in the lower river catchment. It is suggested that agricultural land-use changes, in particular the conversion of pasture to intensively-farmed arable land, are, at least, partly responsible for the increased sedimentation rates in the Avon Estuary. Sediment tracing tools are shown to provide an important basis for future catchment management decisions in the context of the Water Framework Directive and UK Catchment Sensitive Farming initiatives.