Biography

Kirstie's work focuses on fluvial geomorphology and river management. Her research focusses on how rivers work, how they have evolved, how they have been impacted by anthropogenic disturbance, how catchment sediment budgets and (dis)connectivity work, and how to best use geomorphology in river management practice.

She is probably best known as the co-developer of the River Styles Framework and portfolio of professional development short courses (see www.riverstyles.com). The River Styles Framework is a geomorphic approach for the analysis of rivers that includes assessment of river type and behaviour, physical condition and recovery potential. These analyses are used to develop prioritisation and decision support systems in river management practice. Uptake of the River Styles Framework has now occurred in many places on six continents.

Kirstie has strong domestic and international collaborations in both academia and industry. She has worked for many years on various river science and management projects as part of multi-disciplinary, collaborative teams that include ecologists, hydrologists, social scientists, practitioners and citizens.

Kirstie has also been lucky enough to work in Antarctica for two summer seasons, undertaking research on heavy metal contamination at Casey and Wilkes stations.

Kirstie has co-written and co-edited three books titled "Geomorphology and River Management" (Blackwell, 2005), "River Futures" (Island Press, 2008) and "Geomorphic Analysis of River Systems: An Approach to Reading the Landscape" (Wiley, 2013). She holds several research, teaching and postgraduate supervision awards including the international Gordon Warwick medal for excellence in research.

Authored Books

1. Geomorphic analysis of river systems: an approach to reading the landscape

2. The River Styles® short course: workbook and field guide


4. Practical Applications of the River Styles Framework as a Tool for Catchment-wide River Management: A Case Study from Bega Catchment, NSW, Australia

Edited Books

1. River Futures: An Integrative Scientific Approach to River Repair

Journal articles

1. Soil carbon dynamics and aquatic metabolism of a wet-dry tropics wetland system

2. The dark art of interpretation in geomorphology

3. Extent and effect of the 2019-20 Australian bushfires on upland peat swamps in the Blue Mountains, NSW

4. Things we can do now that we could not do before: developing and using a cross-scalar, state-wide database to support geomorphologically-informed river management

5. Geomorphic controls on the diversity and patterns of fluvial forms along longitudinal profiles
6. Modelling sediment (dis)connectivity across a river network to understand locational-transmission-filter sensitivity for identifying hotspots of potential geomorphic adjustment

7. Semi-automating the calculation of catchment scale geomorphic controls on river diversity using publically available datasets

8. Relationships, social networks and the emergence of recovery-based river management: implications for practice and policy

9. Microbial communities of upland peat swamps were no different 1 year after a hazard reduction burn

10. Forgotten peatlands of eastern Australia: an unaccounted carbon capture and storage system

11. Upland peatlands of eastern Australia as important water storage reservoirs

12. An approach for assessing geomorphic river sensitivity across a catchment based on analysis of historical capacity for adjustment

13. Application of globally available, coarse resolution digital elevation models for delineating valley bottom segments of varying length across a catchment

14. Identifying threshold responses of Australian dryland rivers to future hydroclimatic change

15. River sensitivity and sediment connectivity as tools for assessing future geomorphic channel behavior

16. Supporting champions in river management

17. The importance of relational values in river management: understanding enablers and barriers for effective participation

18. Managing sediment (dis)connectivity in fluvial systems

19. Simulating the effect of environmental flow duration on seedling emergence from riparian seed banks of the Upper Hunter River, New South Wales

20. The hydrological function of a large chain-of-ponds: a wetland system with intermittent surface flows

21. The morphology and geomorphic evolution of a large chain-of-ponds river system

22. The use of the River Styles Framework as a tool to ‘work with nature’ in managing rivers in Brazil: examples from the Macaé Catchment

23. The impact of urbanisation on community structure, gene abundance and transcription rates of microbes in upland swamps of Eastern Australia

24. Water sources of upland swamps in Eastern Australia: implications for system integrity with aquifer interference and a changing climate

25. Engaging with research impact assessment for an environmental science case study

26. Learning, doing and professional development – the River Styles Framework as a tool to support the development of coherent and strategic approaches for land and water management in Brazil
27. To plug-in or not to plug-in? Geomorphic analysis of rivers using the River Styles Framework in an era of big data acquisition and automation

28. Understanding the spatial distribution and physical attributes of upland swamps in the Sydney Basin as a template for their conservation and management

29. Single-grain OSL dating of fluvial terraces in the upper Hunter catchment, southeastern Australia

30. Mapping valley bottom confinement at the network scale

31. Connectivity as an emergent property of geomorphic systems

32. Geomorphic controls on fluvial carbon exports and emissions from upland swamps in eastern Australia

33. The hydrological function of upland swamps in eastern Australia: the role of geomorphic condition in regulating water storage and discharge

34. A nested hierarchical perspective to enhance interpretations and communication in fluvial geomorphology for use in water resources management: lessons from the Okavango Delta, Botswana

35. Tracking geomorphic recovery in process-based river management

36. What’s in a name? A naming convention for geomorphic river types using the River Styles Framework

37. Dramatic reduction in size of the lowland Macquarie River in response to Late Quaternary climate-driven hydrologic change

38. Palaeohydrology of lowland rivers in the Murray-Darling Basin, Australia

39. Geomorphic effectiveness: a linear concept in a non-linear world

40. Practicing sociogeomorphology: relationships and dialog in river research and management

41. Prioritising the placement of riparian vegetation to reduce flood risk and end-of-catchment sediment yields: important considerations in hydrologically-variable regions

42. River sensitivity: a lost foundation concept in fluvial geomorphology

43. Different depths, different fauna: habitat influences on the distribution of groundwater invertebrates

44. Interactive effects of waterlogging and atmospheric CO₂ concentration on gas exchange, growth and functional traits of Australian riparian tree seedlings

45. "Out with the Old?" Why coarse spatial datasets are still useful for catchment-scale investigations of sediment (dis)connectivity
47. Sedimentologically significant tributaries: catchment-scale controls on sediment (dis)connectivity in the Lockyer Valley, SEQ, Australia

48. The Holocene evolution and geomorphology of a chain of ponds, southeast Australia: establishing a physical template for river management

49. A geomorphic assessment to inform strategic stream restoration planning in the Middle Fork John Day Watershed, Oregon, USA

50. The Use of Evolutionary Trajectories to Guide ‘Moving Targets’ in the Management of River Futures

51. How seed traits predict floating times: a biophysical process model for hydrochorous seed transport behaviour in fluvial systems

52. Identifying key sedimentary indicators of geomorphic structure and function of upland swamps in the Blue Mountains for use in condition assessment and monitoring

53. Defining the floodplain in hydrologically-variable settings: implications for flood risk management

54. An approach for measuring confinement and assessing the influence of valley setting on river forms and processes

55. Assessing the geomorphic recovery potential of rivers: forecasting future trajectories of adjustment for use in management

56. Intrinsic and extrinsic controls on the geomorphic condition of upland swamps in Eastern NSW

57. The spatial distribution and physical characteristics of Temperate Highland Peat Swamps on Sandstone (THPSS)

58. A framework and toolbox for monitoring and assessing the swamp condition and ecosystem health

59. The Blurred line between form and process: a comparison of stream channel classification frameworks

60. Catchment- and reach-scale controls on the distribution and expectation of geomorphic channel adjustment

61. Seed banks as a source of vegetation regeneration to support the recovery of degraded rivers: a comparison of river reaches of varying condition

62. A channel evolution model for subtropical macrochannel systems

63. The Disconnected sediment conveyor belt: patterns of longitudinal and lateral erosion and deposition during a catastrophic flood in the Lockyer Valley, South East Queensland, Australia

64. Prospects for, and Challenges of, Research Design and Training in Cross-Disciplinary Environmental Management Research

65. Managing legacy waste in the presence of cultural heritage at Wilkes Station, East Antarctica

66. Rehabilitating upland swamps using environmental histories: A case study of the Blue Mountains Peat Swamps, Eastern Australia

67. Developing and using geomorphic condition assessments for river rehabilitation planning, implementation and monitoring
68. **Metal and petroleum hydrocarbon contamination at Wilkes Station, East Antarctica**

69. **Morphological and historical resilience to catastrophic flooding: The case of Lockyer Creek, SE Queensland, Australia**

70. **Heterogeneous flows foster heterogeneous assemblages: relationships between functional diversity and hydrological heterogeneity in riparian plant communities**

71. **Can the Regeneration of Vegetation from Riparian Seed Banks Support Biogeomorphic Succession and the Geomorphic Recovery of Degraded River Channels?**

72. **Can the sedimentological and morphological structure of rivers be used to predict characteristics of riparian seed banks?**

73. **Quantifying fluvial (dis)connectivity in an agricultural catchment using a geomorphic approach and sediment source tracing**

74. **Geomorphological mapping and taxonomy of fluvial landforms**

75. **Reading the Landscape in Field-Based Fluvial Geomorphology**

76. **Sedimentology and age structure of Temperate Highland Peat Swamps on Sandstone (THPSS) in the Southern Highlands and Blue Mountains of NSW, Australia**

77. **The geomorphic character and hydrological function of an upland swamp, Budderoo Plateau, Southern Highlands, NSW, Australia**

78. **Remediation of metal-contaminated soil in polar environments: Phosphate fixation at Casey Station, East Antarctica**

79. **Groundwater depth and topography correlate with vegetation structure of an upland peat swamp, Budderoo Plateau, NSW, Australia**

80. **Sediment tracing in the upper Hunter catchment using elemental and mineralogical compositions: Implications for catchment-scale suspended sediment (dis)connectivity and management**
Fryirs, K. & Gore, D., 1 Jul 2013, In: Geomorphology. 193, p. 112-121
88. **The type and spatial distribution of past waste at the abandoned Wilkes Station, East Antarctica**

89. **Highlighting the need and potential for use of interdisciplinary science in adaptive environmental management: The case of Endangered upland swamps in the Blue Mountains, NSW, Australia**

90. **Use of ergodic reasoning to reconstruct the historical range of variability and evolutionary trajectory of rivers**

91. **How Does Restoration of Native Canopy Affect Understory Vegetation Composition? Evidence from Riparian Communities of the Hunter Valley Australia**

92. **Geomorphology in action: Linking policy with on-the-ground actions through applications of the River Styles framework**

93. **The Geographic Basis of Geomorphic Enquiry**
   Preston, N., Brierley, G. & Fryirs, K., Jan 2011, In: Geography Compass. 5, 1, p. 21-34 14 p.

94. **What are we monitoring and why? Using geomorphic principles to frame eco-hydrological assessments of river condition**

95. **Climatic and vegetation control on sediment dynamics during the last glacial cycle**

96. **Antecedent controls on river character and behaviour in partly confined valley settings: Upper Hunter catchment, NSW, Australia**

97. **Inside the "Black Box" of river restoration: Using catchment history to identify disturbance and response mechanisms to set targets for process-based restoration**

98. **Has river rehabilitation begun? Social perspectives from the Upper Hunter catchment, New South Wales, Australia**

99. **Don't fight the site: Three geomorphic considerations in catchment-scale river rehabilitation planning**

100. **Naturalness and place in river rehabilitation**

101. **Post-European settlement response gradients of river sensitivity and recovery across the upper Hunter catchment, Australia**

102. **The relationship between geomorphic river adjustment and management actions over the last 50 years in the upper Hunter catchment, NSW, Australia**

103. **Spatial variability in the timing, nature and extent of channel response to typical human disturbance along the Upper Hunter River, New South Wales, Australia**

104. **Where do floodplains begin? The role of total stream power and longitudinal profile form on floodplain initiation processes**

105. **Buffers, barriers and blankets: the (dis)connectivity of catchment-scale sediment cascades**

106. **Catchment-scale (dis)connectivity in sediment flux in the upper Hunter catchment, New South Wales, Australia**

107. **Post-rehabilitation environmental hazard of Cu, Zn, As and Pb at the derelict Conrad Mine, eastern Australia**

108. **Knowing your place: An Australasian perspective on catchment-framed approaches to river repair**
109. Landscape connectivity: The geographic basis of geomorphic applications

110. Linking geomorphic character, behaviour and condition to fluvial biodiversity: Implications for river management

111. The relationship between geomorphic river structure and coarse particulate organic matter (CPOM) storage along the Kangaroo River, New South Wales, Australia

112. Comparative assessment of three approaches for deriving stream power plots along long profiles in the upper Hunter River catchment, New South Wales, Australia

113. Did humid-temperate rivers in the Old and New Worlds respond differently to clearance of riparian vegetation and removal of woody debris?

114. Guiding principles for assessing geomorphic river condition: Application of a framework in the Bega catchment, South Coast, New South Wales, Australia

115. Application of the River Styles framework as a basis for river management in New South Wales, Australia

116. Antecedent landscape controls on river character, behaviour and evolution at the base of the escarpment in Bega catchment, South Coast, New South Wales, Australia

117. Die Auswirkungen antezedenter Landschaftsentwicklung auf Aussehen, Eigenschaften und Entwicklung von Fließgewässern am Fuße der Landstufe im Bega Einzugsgebiet, Südküste von New South Wales, Australien

118. Variability in sediment delivery and storage along river courses in Bega catchment, NSW, Australia: Implications for geomorphic river recovery

119. A geomorphological framework for river characterization and habitat assessment

120. A geomorphic approach to the identification of river recovery potential

121. River styles, a geomorphic approach to catchment characterization: Implications for river rehabilitation in Bega catchment, New South Wales, Australia

122. River Styles in Bega Catchment, NSW, Australia: Implications for river rehabilitation

123. Habitat assessment using the River Styles™ methodology

124. Post-European changes to the fluvial geomorphology of Bega catchment, Australia: Implications for river ecology

125. Tributary-trunk stream relations in a cut-and-fill landscape: A case study from Wolumla catchment, New South Wales, Australia

126. Slope-channel decoupling in Wolumla catchment, New South Wales, Australia: the changing nature of sediment sources following European settlement

127. A fluvial sediment budget for upper Wolumla Creek, south coast, New South Wales, Australia

128. The character and age structure of valley fills in upper Wolumla Creek catchment, south coast, New South Wales, Australia

Book Chapters
1. Abordagens de Restauraçao Fluvial na Australasia
2. Impacts of land clearing

3. River types and contemporary sediment storage

4. Assessment of riparian seed bank resources for river rehabilitation: Wollombi Brook, Lower Hunter Valley, NSW

5. Underfit streams in the upper Hunter catchment NSW: Antecedent controls on partly-confined river behaviour

6. Suspended sediment connectivity of the Lower Macquarie River system, central west NSW, Australia.

7. Moves towards an era of river repair

8. River futures

9. Working with change: the importance of evolutionary perspectives in framing the trajectory of river adjustment

10. Principles of river condition assessment

11. The Australian river management experience

12. Social and biophysical connectivity of river systems

13. Sediment organisation along the upper Hunter River, Australia: A multivariate statistical approach

14. Sediment organisation along the upper Hunter River, Australia: a multivariate statistical approach

15. Sedimentary cascades in Australian river systems: Using examples from the Bega and Hunter catchments to demonstrate (dis)connectivity of sediment movement and its implications for river recovery

16. The distribution of organic matter along the Kangaroo River, NSW

17. Bega River: Sediment Source, Transfer and Accumulation Zones

18. Bega River: Impacts of European settlement on sediment transfer relationships
1. **Identifying corridors of river recovery in coastal NSW for use in decision support and prioritisation systems**

2. **The certified environmental practitioner scheme geomorphology specialisation**

3. **Reviewing fire as a vegetation management technique in highly modified riparian ecosystems**

4. **Do we still need a human? Geomorphic analysis and interpretation of river systems in an age of emerging technology and big data**

5. **Delineating multiple flow paths in anastomosing river systems with wetlands using DEMs**

6. **Exploring the relationship between channel bed control structures and stream power in low-gradient floodplain wetlands**

7. **A quarter-century of evolution in Australian stream management: trends and prospects**

8. **The recovery of riparian vegetation along rivers of coastal NSW since the 1980s: implications for working with river recovery in management**

9. **Ecosystem productivity of a wet-dry tropics wetland system: establishing a baseline understanding for conservation**

10. **It's a good news story! Tracking geomorphic recovery of rivers in eastern New South Wales as part of process-based river management**

11. **Towards defining geomorphic rarity and vulnerability; use of River Styles in High Ecological Value Aquatic Ecosystems (HEVAE)**

12. **Trialling the use of controlled burning for exotic vegetation management in novel riparian ecosystems**

13. **Sociogeomorphic river recovery: integrating human and physical processes in rehabilitation**
14. A toolbox of sedimentary indicators for assessing the geomorphic structure, function and condition of endangered Temperate Highland Peat Swamps on Sandstone (THPSS), Blue Mountains, NSW

15. The use and usefulness of geomorphology in river management

16. Sedimentologically significant tributaries: characterizing sediment connectivity in the Lockyer Valley, SEQ

17. Relating with rivers: geomorphic foundations for ethical cross-cultural dialogue in river management

18. Management and conservation of a unique and diverse Australian river type: chain-of-ponds

19. Adaptive management of Temperate Highland Peat Swamps on Sandstone in the Blue Mountains: is it occurring?

20. The importance of ‘moving targets’ in assessing what is physically achievable and what we seek to achieve in river restoration practice

21. Developing a model of upland swamp structure, function and evolution for biodiversity conservation and rehabilitation: the case of threatened Temperate Highland Peat Swamps on Sandstone (THPSS)

22. Is passive revegetation through utilisation of soil seed banks a viable rehabilitation option in riparian ecosystems?

23. On-site teaching with XRF and XRD: training the next generation of analytical X-ray professionals

24. The Formation and geomorphic condition of upland swamps in the Blue Mountains: rehabilitation potential of these endangered ecosystems

25. Tracing sediment supply to a colmation layer in the upper Hunter River using X-ray diffractometry: implications for catchment-scale sediment management

26. Depth, stratification and viability of seed banks in riparian systems: Watagan Creek, NSW

27. Using geomorphology in river management: linking policy with on-the-ground actions through applications of the River Styles framework in NSW

28. Space, place and a healthy dose of realism: Grounding the process of river repair
29. The importance of reach sensitivity and catchment connectivity in river rehabilitation planning

30. Challenges faced in the integration of science in river management in Australia

31. An interdisciplinary perspective of riverwork projects in the upper Hunter catchment: Has river rehabilitation begun?

32. Making Integrative, Cross-disciplinary Research Happen: Initial Lessons from the Upper Hunter River Rehabilitation Initiative

33. A catchment scale perspective on biophysical fluxes in the upper Hunter: Constraints and limiting factors on a large river rehabilitation experiment at Muswellbrook, NSW

34. Landscape perspectives on river rehabilitation practice

35. Linking landscape processes and river systems: Assessing implications of catchment-scale (dis)connectivity of sediment movement on river sensitivity, recovery and river management

36. Geomorphic controls on Coarse Particulate Organic Matter (CPOM) distribution: Implications for river rehabilitation

37. Sedimentary Cascades in Australian River Systems: Using Examples from the Bega and Murrumbidgee Catchments to Demonstrate the Connectivity of Sediment Movement and Its Implications for Geomorphic River Recovery

38. Creating a catchment-framed biophysical vision for river rehabilitation programs

39. Application of the river styles framework to river management programs in New South Wales

40. The recovery potential of river styles in Bega catchment, NSW: a catchment based framework for prioritisation of river rehabilitation strategies