

Water Research Network

Annual Report 2014



.....to achieve more effective monitoring, modelling and management of hydrological, hydrogeological, climatological and aquatic ecological systems, to have a real impact on the sustainable management of these systems ... through innovative research, engagement with industry and relevant stakeholders, excellence in higher education and a focus on the production of high impact outcomes.

<http://federation.edu.au/research/research-areas/research-centres-and-networks/wrn>

Group Membership

| | | |
|---------------------------|------------------------|-------------------------|
| Dr Andrew Barton | Dr Michelle Graymore | Dr Peter Newall |
| Dr. Fred Cahir | Ms Rosie Grundell | Dr. Jessica Reeves |
| Dr Stephen Carey | Dr. Ander Guinea | Dr Roy Schrieke (Hon) |
| Dr Michelle Casanova | Dr Birgita Hansen | Dr Nick Schultz |
| Dr. Savin Chand | Prof Hiroyuki Ii (Hon) | Dr. Andy Shugg |
| Dr Mathew Currell (Hon) | Mr Lance Lloyd (Hon) | Dr. Harpreet Singh |
| Dr Peter Dahlhaus | Dr Jasmyrn Lynch (Hon) | Dr Jonathan Tyler (Hon) |
| Prof. Max Finlayson (Hon) | Dr Keely Mills (Hon) | Prof. Rob Wilby (Hon) |
| Prof Peter Gell | Dr Lucy Nairn | |

Post Graduate Students

Phuong Doan, Islam Atazadeh, Joji Abraham, Mahinda Jayasooriya, Neeraj Mall, Scott Williams, Adam Marshall, Nathan Robinson.

Mission Statement

Our mission is to achieve more effective monitoring, modelling and management of hydrological, hydro-geological, climatological and aquatic ecological systems to have a real impact on the sustainable management of these systems. This will be done through innovative research, engagement with industry and relevant stakeholders, excellence in higher education and a focus on the production of high impact outcomes.

Values

We value:

- integrity in research, communication and stakeholder partnerships
- sustainability of ecological aims within management practices
- the importance of water in a local, regional and global context
- holistic approaches to the management of water resources
- independent, globally relevant, high quality research
- research provision for regional communities
- strong collaborative relationships
- ensuring the next generation of quality researchers

Vision

Our vision is to be leaders in integrated, interdisciplinary water research and management; with diverse capacity in all aspects of water quality, water management, hydrology, hydro-geomorphology, aquatic ecology and hydroclimatology.

Cover Photo: participants in the Australia China Wetlands Research Network Partnership symposium featuring Prof. Frank Stagnitti (DVCR&I) and WRN members Prof. Max Finlayson, Prof. Peter Gell and Dr. Giri Kattel.

Publications

1. Almandalawi M., You G., **Dahlhaus P.**, Dowling K. & Sabry M. (2015). Slope stability and rockfall hazard analysis in open pit zinc mine. *International Journal of GEOMATE*, 8/1: 1143-1150
2. Atazadeh, I., **Barton, A. & Gell, P., Mills, K. & Newall, P.** (2014) Development of an algal response model to inform water resources operation. *Proceedings of the Hydrology and Water Resources Symposium*, pp. 78- 85.
3. **Atazadeh I.**, Edlund M.B., Van de Vijver B., **Mills K.**, Spaulding S.A., **Gell P.**, Crawford S., **Barton A.F.**, Lee, S.S., Smith, K.E.L., **Newall, P.** & Potapova M. (2014) Morphology, ecology and biogeography of *Stauroneis pachycephala* P.T. Cleve (Bacillariophyta) and its transfer to the genus *Envekadea*. *Diatom Research*.
4. Barr, C., Tibby, J., **Gell, P., Tyler, J.**, Zawadzki, A. & Jacobsen, G. (2014). Climatic variability in southeastern Australia over the last 1500 years inferred from the fossil diatom records of two crater lakes. *Quaternary Science Reviews*, 95: 115-131.
5. Capon, S.J., Lynch, A.J.J., Bond, N., Chessman, B., Davis, J., Davidson, N., **Finlayson, M., Gell, P.**, Hohnberg, D., Humphrey, C., Kingsford, R., Nielsen, D., & Ward, K. Thomson, J. & Mac Nally, R. (in press). Regime shifts, thresholds and multiple stable states in freshwater ecosystems; a critical appraisal of the evidence. *Science of the Total Environment*.
6. **Casanova, M.T.** (2015). Chromosome numbers of Australian charophytes (Characeae, Charophyceae). *Phycologia*. In press.
7. **Casanova, M.T.** (2015). A revision of Chara sect. Charopsis (Characeae: Charophyceae), in Australia including specimens collected for Bush Blitz. *Australian Systematic Botany*. In press.
8. **Casanova, M.T.** (under revision) Historical water plant occurrence and environmental change in two contrasting catchments. *Marine and Freshwater Research*.
9. **Casanova, M.T.** (under revision). The seed bank as a mechanism for resilience and connectivity in a seasonal unregulated river. *Aquatic Botany*.
10. **Casanova, M.T.** (submitted) Distinguishing between the effects of agricultural land-use and riparian gradients on vegetation along an unregulated seasonal river. *Agriculture, Ecosystems and Environment*.
11. **Casanova, M.T.** & Karol, K.G. (2014). A revision of ecorticate species of *Chara* in Australia (section Protochara sect. nov.) (Characeae, Charophyceae). *Australian Systematic Botany* 27:23-27.
12. **Casanova, M.T.** & **Nairn, L.** (2015). Bryophytes, charophytes and macroalgae of Australian riparian systems. (in) Capon, S.J., James, C. & Reid, M. (eds) *Vegetation of Australia's Riverine Landscapes: Biology, Ecology & Management*, CSIRO Publishing, Melbourne. In press.
13. **Casanova, M.T.** & Powling, I.J. (2014). What makes a swamp swampy? Water regime and the botany of endangered wetlands in western Victoria. *Australian Journal of Botany*, 62: 469-480.
14. **Chand, S. S.**, Chambers, L. E., Waiwai, M., Malsale, P., & Thompson, E. (2014) Indigenous knowledge for environmental prediction in the Pacific island countries. *Weather, Climate and Society*, 6: 445-450.
15. Cowle, M., A. Babatunde, W. Rauen, B. Bockelmann-Evans and **A. F. Barton** (2014). "Biofilm development in water distribution and drainage systems: dynamics and implications for hydraulic efficiency." *Environmental Technology Reviews*. DOI:10.1080/09593330.2014.923517.
16. **Currell M.J., Dahlhaus P.G. & Ii, H.** (2014). Stable isotopes as indicators of water and salinity sources in a southeast Australian coastal wetland: identifying relict marine water, and implications for future change. *Hydrogeology Journal*. DOI 10.1007/s10040-014-1199-9.
17. **Currell M.J.**, Gleeson T. & **Dahlhaus P.G.** (2014). A new assessment framework for transience in hydrogeological systems. *Groundwater*. DOI 10.1111/gwat.12300.
18. Davis, J.A., O'Grady, A.P., Dale, A., Arthington, A.H., **Gell, P.**, Driver, P., Bond, N., Casanova, M., **Finlayson, M.**, Watts, R., Capon, S., Nagelkerken, I., Tingley, R., Fry, B., Page, T.J., Specht, A. (accepted). When trends collide: the challenge of protecting freshwater ecosystems under multiple land use and hydrological intensification scenarios. *Science of the Total Environment*.
19. Dearing, J.A., Acma, B., Bub, S., Chambers, F., Chen X., Cooper, J., Crook, D., Dong Xuhui, Dotterweich, M., Edwards, M.E., Foster, T.H., Gaillard, M.-J., Galop, D., **Gell, P.**, Gil, A., Jeffers, E., Jones, R.T., Krishnamurty,

- A., Langdon, P.G., McLean, C., Nunes, L.H., Umer, M., Yang Xiangdong, Wang Rong. (accepted) Regional integration of past biophysical and social records: a new foundation for the sustainable management of socio-ecological systems. *The Anthropocene Review*.
20. **Gell, P.** (accepted). The Coorong. In Weckstrom, K., **Gell, P.**, Saunders, K & Skilbeck, G. The Palaeolimnology of Estuarine Systems, Developments in Paleoenvironmental Research, Springer.
 21. **Gell, P.** (submitted). The Coorong, Murray Darling River Basin, Australia. In, Finlayson, M., (Ed) Encyclopaedia of Wetlands. SpringerReference.
 22. **Gell, P.** (2014). Sedimentation after European Settlement. Text box in Boulton *et al.* 'Australian Freshwater Ecology: Processes and Management'.
 23. **Gell, P.**, Burge, O. & Flower, R. (2014). Ramsar wetlands: Understanding change in Ecological character. *PAGES Magazine*, 22(2): 51.
 24. **Gell, P.** & Reid, M. (2014). Assessing change in floodplain wetland condition in the Murray Darling Basin. *The Anthropocene*.
 25. **Graymore, M.** (2014) Sustainability Reporting: an approach to get the right mix of theory and practicality for local actors. *Sustainability*, 6: 3145-3170; doi:10.3390/su6063145
 26. **Graymore, M.** & Harriden, K. (accepted). Water use diaries: A tool for household water management. In: Leal, W. & Sumer, V. (eds) *Sustainability in Water Resources Management (title to be confirmed)* Publisher: Springer
 27. Hale, R., Reich, P., Johnson, M., **Hansen, B.**, Lake, P.S., Thomson, J.R., Mac Nally, R. (2015) Bird Responses to Riparian Management of Degraded Lowland Streams in Southeastern Australia. *Restoration Ecology*, Early View.
 28. **Hansen, B.D.**, Menkhorst, P., Loyn, R.H. & Moloney, P. (2015) Long-term declines in multiple waterbird species in a tidal embayment, south-east Australia. *Austral Ecology* Early view.
 29. **Hansen, B.D.**, Reich, P., Lake, P.S. & Cavagnaro, T. (2015) Challenges in applying scientific evidence to width recommendations for riparian management in agricultural Australia. *Ecological Management & Restoration*, 16(1)
 30. **Hansen, B.D.**, Minton, C.D.T., Harrison, A.E. & Jessop, R. (2014) Conservation assessment of the Sooty Oystercatcher *Haematopus fuliginosus*. *International Wader Studies* 20, 161-172.
 31. Herbert, E.R., Neubauer, S.C., Burgin, A.J., Ardon, M., **Gell, P.**, Hopfesburger, K. & Boon, P. (submitted). Salinization of freshwater wetlands: A cross-ecosystem synthesis. *Ecosphere*.
 32. **Kattel, G.**, **Gell, P.**, Grundell, R., Zawadzki, A. & Barry, L. (submitted). A multi-proxy palaeolimnological study in Kings Billabong in the lower Murray River system, Australia: a test of resilience. *River Research and Applications*.
 33. **Kattel, G.**, **Gell, P.**, Perga, M., Jeppesen, E., **Grundell, R.**, Weller, S., Zawadzki, A. & Barry, L. (2014). Tracking a century of change in trophic structure and dynamics in a floodplain wetland: integrating palaeo-ecological, and palaeo-isotopic, evidence. *Freshwater Biology*. doi:10.1111/fwb.12521.
 34. **Lynch, A.J.**, Thackway, R., Specht, A., Beggs, P., Brisbane, S., Burns, E., Byrne, M., Capon, S.J., **Casanova, M.T.**, Clarke, P.A., Davies, J., Dovers, S., Dwyer, R., Ens, E., Fisher, D., Flanigan, M., Garnier, E., Guru, S., Kilminster, K., Locke, J., MacNally, R., McMahon, K., Mitchell, P., Pierson, J., Rodgers, E., Russell-Smith, J., Udy, J. & Waycott, M. (submitted). The contribution, role and value of transdisciplinary synthesis for ecosystem science, policy and management. *Science of the Total Environment*.
 35. Mala-Jetmarova, H., **A. F. Barton** and A. Bagirov (2014). "Exploration of the tradeoffs between water quality and pumping costs in the optimal operation of regional pipeline systems." *ASCE Journal of Water Resources Planning and Management*. DOI: 10.1061/(ASCE)WR.1943-5452.0000472.
 36. Mala-Jetmarova, H., **A. F. Barton** and A. Bagirov (2014). "History of Water Distribution Systems and their Optimisation." *Water Science and Technology: Water Supply Online* DOI:10.2166/ws.2014.115

37. Mala-Jetmarova, H., **A. F. Barton** and A. Bagirov (2014). Optimal operation of a multiquality water distribution system with changing reservoir turbidity and salinity levels. 16th Conference on Water Distribution Systems Analysis. Italy.
38. **Mills, K.**, Ryves, D.B., Anderson, N. J., Bryant, C. & **Tyler, J.** (2014). Expressions of climate perturbations in western Uganda during the last 1000 years. *Climate of the Past*, 10: 1581-1601.
39. **Newall, P., Lloyd, L., Gell, P.** & Walker, K. (submitted) Implications of environmental trajectories on limits of acceptable change at the Riverland Ramsar Site. *Marine & Freshwater Research*.
40. Pearson, S., **Lynch, A.J.J.**, Plant, R., Cork, S., Taffs, K., Dodson, J., Maynard, S., Gergis, J., **Gell, P.**, Thackway, R., Sealie, L. & Donaldson, J. (2014). Increasing the understanding and use of natural archives of ecosystem services, resilience and thresholds to improve policy, science and practice. *The Holocene*. DOI: 10.1177/0959683614558650.
41. Rasiah V., Florentine, S. & **Dahlhaus P.** (2014). Environmental benefits inferred from impact of reforestation of deforested creek bank on soil conditioning: a case study in Victoria, Australia. *Agroforestry Systems*. DOI 10.1007/s10457-014-9771-9.
42. **Reeves, J.M.** (accepted). Ostracods as recorders of palaeoenvironmental change in estuaries. In: Weckström, K., Saunders, K., **Gell, P.**, & Skilbeck, G. (eds). *Application of Paleoenvironmental Techniques in Estuarine Studies*. DPER Volume, Springer.
43. **Reeves, J.M., Gell, P.A., Grundell, R.**, Trewarn, A., Reichman, S., Gadd, P. & Zawadaski, A. (submitted). Industrial past, urban future: Using palaeo-studies to determine the industrial legacy of the Barwon Estuary, Victoria, Australia. *Marine and Freshwater Research*.
44. **Reeves, J.M.**, Haynes, D., Garcia, A. & **Gell, P.A.** (2014). Hydrological change in the Coorong Estuary, Australia, Past and Present: Evidence from fossil invertebrate and algal assemblages. *Estuaries and Coasts*. DOI 10.1007/s12237-014-9920-4
45. Reid, M., Bickford, S., **Gell, P.**, & Kenyon, C. (in press). A history of Australian riverine vegetation. in Capon, S.J., James, C. & Reid, M. (eds) *Vegetation of Australia's Riverine Landscapes: Biology, Ecology & Management*, CSIRO Publishing, Melbourne.
46. Rouillard, A., Skrzypek, G., Turney, C., Dogramaci, S., Hua, Q., Zawadaski, A., **Reeves, J.**, Greenwood, P., Grierson, P. (submitted). Evidence for 'megafloods' in arid subtropical Western Australia during the Little Ice Age Chronozone. *Quaternary Science Reviews*
47. Sachindra, D. A., F. Huang, **A. F. Barton** and B. J. C. Perera (2014). "Multi-Model Ensemble Approach for Statistically Downscaling General Circulation Model Outputs to Precipitation " *Quarterly Journal of the Royal Meteorological Society* 140(681): 1161–1178.
48. Sachindra, D. A., F. Huang, **A. F. Barton** and B. J. C. Perera (2014). Multi-station downscaling of precipitation. Practical Responses to Climate Change. 25 - 27 November, Melbourne.
49. Sachindra, D. A., F. Huang, **A. F. Barton** and B. J. C. Perera (2014). "Potential Improvements to Statistical Downscaling of General Circulation Model Output to Catchment Streamflows with Downscaled Precipitation and Evaporation." *Theoretical and Applied Climatology* DOI:10.1007/s00704-014-1288-7.
50. Sachindra, D. A., F. Huang, **A. F. Barton** and B. J. C. Perera (2014). "Statistical downscaling of general circulation model outputs to evaporation, minimum temperature and maximum temperature using a key-predictand and key-station approach." *Journal of Water and Climate* DOI:10.2166/wcc.2014.145.
51. Sachindra, D. A., F. Huang, **A. F. Barton** and B. J. C. Perera (2014). "Statistical downscaling of general circulation model outputs to catchment scale hydroclimatic variables: Issues, challenges and possible solutions." *Journal of Water and Climate Change* DOI:10.2166/wcc.2014.056.
52. Sachindra, D. A., F. Huang, **A. F. Barton** and B. J. C. Perera (2014). "Statistical downscaling of general circulation model outputs to precipitation Part 1: Calibration and validation." *International Journal of Climatology* 34(11): 3264–3281.

53. Sachindra, D. A., F. Huang, **A. F. Barton** and B. J. C. Perera (2014). "Statistical downscaling of general circulation model outputs to precipitation Part 2: Bias correction and future projections." *International Journal of Climatology* 34(11): 3282–3303.
54. **Schwarz, I., Graymore, M.L.M.**, Park, D. & Sounness, C. Emitter or storer? The influence of farmer greenhouse gas knowledge on mitigation actions. (under review). *Society and Natural Resources*.
55. **Schultz, N.L.**, Reid, N., Lodge, G. & Hunter, J.T. (2014) Seasonal and interannual variation in vegetation composition: Implications for survey design and data interpretation. *Austral Ecology*, 39: 755-66.
56. **Schultz, N.L.**, Reid, N., Lodge, G. & Hunter, J.T. (2014) Broad-scale patterns in plant diversity vary between land uses in a variegated temperate Australian agricultural landscape. *Austral Ecology*, 39: 855-63.
57. Seddon, A.W.R., Mackay, A.W., Baker, A.G., Birks, H.J.B., Bremen, E., Buck, C.E., Ellis, E.C., Froyd, C.A., Gill, J.L., Gillson, L., Johnson, E.A., Jones, V.J., Juggins, S., Macias-Fauria, M., **Mills, K.**, Morris, J.L., Nogués-Bravo, D., Punyasena, S.W., Roland, T.P., Tanentzap, A.J., Willis, K.J., Aberhan, M., van Asperen, E.N., Austin, W.E.N., Battarbee, R.W., Bhagwat, S., Balanger, C.L., Bennett, K.D., Birks, H.H., Ramsey, C.B., Brooks, S.J., de Bruyn, M., Butler, P.G., Chambers, F.M., Clarke, S.J., Davies, A.L., Dearing, J.A., Ezard, T.H.G., Feurdean, A., Flower, R.J., **Gell, P.**, Hausmann, S., Hogan, E.J., Hopkins, M.J., Jeffers, E.S., Korhola, A.A., Marchant, R., Kiefer, T., Lamentowicz, M., Larocque-Tobler, I., López-Merino, L., Hsiang Liow, L., McGowan, S., Miller, J.H., Montoya, E., Morton, O., Nogués, S., Onoufriou, C., Boush, L.P., Rodriguez-Sanchez, F., Rose, N.L., Sayer, C.D., Shaw, H.E., Payne, R., Simpson, G., Sohar, K., Whitehouse, N.J., Williams, J.W. & Witkowski, A. (2014) Looking forward through the past. Identification of fifty priority research questions in palaeoecology. *Journal of Ecology*, 102: 256-267.
58. **Shugg, A.** (2014). Occurrence of high bicarbonate groundwater in Victoria, Australia. (in) Walderer, W., Porowski, A., Idris, H. & LaMoreaux, J.W. (eds) *Thermal and Mineral Waters: Origins, Properties and Applications*, Springer: 97-110.
59. Taylor, I.R., Newman, M.G., Park, P., **Hansen, B.D.**, Minton, C.D.T., Harrison, A.E. & Jessop, R. (2014) Conservation assessment of the Australian Pied Oystercatcher *Haematopus longirostris*. *International Wader Studies*, 20: 116-128.
60. Torn, K., Beilby, M.J., **Casanova, M.T.** & Al Kazaly, S. (2014). Formation of extracellular sulphated polysaccharide mucilage in the salt tolerant Characeae *Lamprothamnium*. *International Review of Hydrobiology*, 98: 1-9.
61. **Tyler, J., Mills, K.**, Barr, C., Sniderman, K., **Gell, P.** & Karoly, D. (accepted). Identifying coherent patterns of environmental change between multiple multivariate records: an application to four 1000 year diatom records from Victoria, Australia. *Quaternary Science Reviews*.
62. Weckström, K., Saunders, K., **Gell, P.** Skilbeck, G. (Eds) (accepted). *Application of paleoenvironmental techniques in estuarine studies*. DPER Volume, Springer.
63. Wells, P.K., & **Graymore, M.L.M.** (2014) Are Transition Towns Indicators of Deinstitutionalisation of Aspects of Western Culture? *International Journal of Society Systems Science* 6(3).

Professional Reports

Barton, A. F., D. M. Silva and J. Ugon (2014). Leak Detection Algorithms: A Final Report to Optias Pty. Ltd. (For South East Water). Ballarat, Federation University Australia. Research Report.

Chand, S. S. et al. Tropical Cyclones – Intraseasonal Time Scales. Report for WMO 8th International Workshop on Tropical Cyclones. 21pp.

Dahlhaus P.G. & Thompson H. (2014). GRDC eResearch. Online knowledge base, research data and tools to enhance Australian grains research. Discussion Paper. Centre for eResearch and Digital Innovation. Federation University Australia. 12p.

Dahlhaus P.G. & Thompson H. (2014). Visualising Ballarat - past, present, future. A collaborative research proposal to develop online tools to support Ballarat's Historic Urban Landscape program. Discussion Paper. Centre for eResearch and Digital Innovation. Federation University Australia. 11p.

Dahlhaus P.G., Thompson H., McKenna K. & Milne R. (2014). Building Resilience in Farming and Agribusiness - Victorian Adaptation Sustainability Partnerships. Literature Review and gap analysis. Final Report. Centre for eCommerce and Communications. Federation University Australia. 36p.

Gell, P. & Peake, P. (2014 a, b & c). Lake Cowal Waterbird Biomonitoring. Reports for Barrick Gold.

Godoy, W. and **A. F. Barton** (2014). Environmental Water Demand Modelling for Glenelg and Wimmera Catchments: A report to the Department of Environment and Primary Industries. Melbourne, Godoy Consulting. Consultant's Report.

Graymore, M. (2014) Building Local Government Change Agents for Resilient and Sustainable Communities: Final Report. Wimmera Research Group, Federation University Australia, Horsham.

Hansen, B., Wevill, T., Hettihewa, S. and **Gell, P.** 2014. Narmbool Biodiversity and Carbon Project. Unpublished report for Sovereign Hill Museums Association. Federation University Australia.

Kattel, G.R. 2014 Proceedings of the Australia-China Wetland Network Research Partnership Symposium (March 23-28) Nanjing (China), Collaborative Research Network, Federation University Australia, Mt. Helen, Australia.

Liu, J., **Kattel, G. R.**, Arp, H.P.H. & Yang, H. 2014 Towards threshold-based management of freshwater ecosystems in the context of climate change. *Ecological Modelling*, doi.org/10.1016/j.ecolmodel.2014.09.010

Menkhorst, P. and **Hansen, B.** 2014. Investigating the utility of monitoring bird communities to inform the Victorian Index of Estuarine Condition. Unpublished client report to Victorian Office of Water. Department of Environment and Primary Industries, Heidelberg, Victoria

Menkhorst, P., Loyn, R.H., **Hansen, B.**, Liu, C., McKay, M. and Dann, P. 2014. Trends in numbers of piscivorous birds in Western Port and West Corner Inlet, Victoria, 1987–2012. Unpublished client report to Melbourne Water. Arthur Rylah Institute for Environmental Research, Department of Environment and Primary Industries, Heidelberg, Victoria

Newall, P. R., **L. N. Lloyd**, **A. F. Barton** and M. Cooling (2014). SDL offsets projects - risks investigation, assessment and management strategy: A report to the Mallee Catchment Management Authority. Syndal, Victoria. Lloyd Environmental Pty Ltd. Consultant's Report.

Ollerenshaw **A.**, **Dahlhaus P.G.**, McDonald K., Courvisanos J., **Graymore M.**, Thompson H., Sheil H., Miner A. & Corbett J. (2014). Understanding the 2011 Grampians Natural Disaster, addressing the risk and resilience. Final Report. Centre for eCommerce and Communications. Federation University Australia. 131p.

Research Projects

Prof. Peter Gell continued his leadership of the Regional landscape Change element of the University’s Collaborative Research Network. He worked in AINSE projects analysing long term change in Moorna Lake, NSW, (with honours student Garry Heinitz) and Psyche Bend Lagoon (with honours student Paulo Silva) on the lower Murray River system, and on the Anglesea River estuary. **Peter Gell** continues to report on triannual waterbird monitoring at Lake Cowal for Barrick Gold.

Dr. Andrew Barton, Peter Gell, Peter Newall and **Michelle Graymore** continued their various collaborations to work on “Using consumptive flows to enhance stream biodiversity”, and “Understanding the mixing behaviour of a deep reservoir for a range of hydrological and water quality scenarios” for Grampians Wimmera Mallee Water. **Dr Andrew Barton** also continued his collaboration with Victoria University to complete a joint ARC Linkage project. Andrew also completed a number of consulting projects for South East Water, GWMWater, Mallee CMA, NECMA, DEPI and CHW.

Dr. Giri Kattel worked on his project Understanding ecological resilience of two contrasting floodplain wetlands in the River Murray system funded through the AINSE Grant scheme (#ALNGRA14533)

Dr. Peter Dahlhaus undertook numerous groundwater research projects including:

- “On-line browser-based 3d visualisation of groundwater systems” for the Bureau of Meteorology.
- Visualising Victoria's Groundwater (VVG) for CERDI
- Groundwater international interoperability experiment (GW2IE) for CERDI
- Corangamite soil health knowledge base; and the Corangamite natural resource management planning portal pilot both for the Corangamite CMA
- Wimmera Victorian Adaption Sustainability Partnerships (VASP) for the West Wimmera shire
- Hydrogeology of the Lower Barwon wetlands and estuary for CERDI
- Groundwater dependency of the Western District lakes for CERDI
- Groundwater provenance in the LaTrobe Valley coal mines for GHREG and CERDI

Dr Jessica Reeves continued work on palaeoclimatic research through the SHAPE (Southern Hemisphere Assessments of Palaeoenvironments) network, including a climate synthesis of the 60-30 ka time period and the glacial record of Lake Keilambete. She also worked with Honours student, Adam Trewarn, on the AINSE project on the influence of industrial contaminants on the Lower Barwon.

The WRN will take a leadership role in the development of a business case into the Gippsland Lakes Research Centre of Excellence, with support from the Gippsland Lakes Ministerial Advisory Council.

Dr Birgita Hansen has completed her research fellow position within the Collaborative Research Network which generated several publications relating to waterbird population trends, ecology, conservation and management of their wetland and estuarine habitats. She has developed a line of research on riparian restoration and management and has completed an intensive period of field survey in intermittent riparian systems in northern Victoria, seeking to understand the relationship between condition and management of riparian zones and the response of breeding woodland birds. This research is now in the analytical phase. She has also developed a new line of investigation into the use of urban wetlands by Latham’s Snipe in south-west Victoria.

Dr Michelle Graymore completed her research on building behaviour change capacity of local government staff with the Local Government Change Agents project and the *Understanding 2011 Grampians Natural Disaster, addressing the Risk and Resilience project*, where she is now applying a community resilience framework to the data collected to better understand the strengths and weaknesses in the resilience of the Halls Gap community. She, along with **Dr Andrew Barton**, have developed a project proposal to investigate the Maryborough community's attitudes to their town's water supply in order to understand how community values and beliefs are formed, shaped and influenced and how they influence water use behaviours. She is taking a leadership role in the project team developing a business case for a Gippsland Lakes Research and Education Centre of Excellence.

Dr. Michelle Casanova

- Systematics and ecology of Australian Characeae (collaboration with Ken Karol (NYBG) and RBG Melbourne) (2 funding applications currently with ABRS and Bush Blitz).
- Ecology of temporary wetlands (collaboration with I.J. Powling, Glenelg Hopkins CMA and Landcare groups) (1 funding application currently with Ian Potter Foundation).
- A database of Australian Waterplant Traits (collaboration with C.M. Finlayson, D.Neilsen, P.Driver, K.Ward).
- Charophyte occurrence in palaeosediments (with Dr. Giri Kattel)

Dr. Savin Chand

- Established research collaborations with Meteorological Services in the Pacific island countries.
- Continued research on tropical cyclones and climate change in collaboration with the Bureau of Meteorology and Melbourne University.
- A number of papers are currently being prepared for publication in top journals, including Nature Climate Change.

Conferences

Conference Organisation

The Water Research Network, led by **Dr. Giri Kattel**, hosted a very successful conference in Nanjing, China around the formation of the China-Australia Wetlands Collaborative Research Network (Cover photo). **Dr. Keely Mills** convened the 2014 British Diatom Meeting at Hay-on-Wye, UK. **Dr. Jessica Reeves** convened the 30th anniversary Australasian Quaternary biennial meeting in Mildura in July, 2014, which included a well-attended public lecture and 2-day fieldtrip to the Willandra World Heritage site.

Invited Addresses

Gell, P.A. (2014). Palaeoecological Information for the Ramsar Convention on Wetlands. Joint PAGES/Institut Pierre Simon Laplace meeting, Paris.

Gell, P.A. & Dearing, J. (2014). Trajectories of Wetland Change: Understanding natural ecological character from a deeper temporal perspective. Joint Aquatic Sciences Meeting; Ramsar symposium Portland, USA.

Gell, P.A. & Reid, M.A. (2014). Assessing change in floodplain wetland condition in the Murray Darling Basin. Australian-China Wetlands Collaborative Research Network meeting – Nanjing.

Other presentations

Almandalawi M., You G., **Dahlhaus P.**, Dowling K. & Sabry M. (2014). Slope stability and rockfall hazard analysis in an open pit zinc mine. *Proceedings, GEOMATE2014 - The 4th International Conference on Geotechnique, Construction Materials and Environment, 19-21 November 2014, University of Southern Queensland, Brisbane, Australia.*

Atazadeh, I., Barton, A., Gell, P., Mills, K. & Newall, P. (2014). Developing a tool to assist in the configuration of flows for a regulated river: using diatom assemblages as an indicator of river health. *International Diatom Symposium, Nanjing.*

Casanova, M.T. Management of temporary aquatic habitats in an agricultural landscape: examples from southern Australia. Joint Aquatic Sciences Meeting, Portland Oregon.

Cohen, T., **Reeves, J.**, Krause, C., Fletcher, M. and OZ-INTIMATE members (2014). SHAPE – Australia 60-30 ka. *AQUA Biennial Meeting, Mildura.*

Dahlhaus P.G., Currell M., Ii H. & McKenna K. (2014). Groundwater dependence of lakes in southwest Victoria, Australia. *Groundwater: Challenges and Strategies. Abstracts, 41st IAH Congress, 15-19 September 2014, Marrakech, Morocco.* T2 (On CD)

Dahlhaus, P., MacLeod, A., McKenna, K. and Milne, R. (2014). On-line information to maximise soil health. *Digital Rural Futures Conference, Regional Futures. Agricultural Futures. Digital Futures. 25th - 27th June 2014, University of Southern Queensland, Toowoomba, Queensland.* Abstracts, pp.80-81

Dahlhaus P.G., Macleod A., McKenna K. & Thompson H. (2014). Creating virtual groundwater research laboratories through interoperable technologies. *Groundwater: Challenges and Strategies. Abstracts, 41st IAH Congress, 15-19 September 2014, Marrakech, Morocco.* T7 (On CD)

Driver, P. & **Casanova, M.T.** Adaptation Pathways for Aquatic Plants under Climate Change: facilitating dispersal and management interventions. ACEAS Grand workshop, Canberra, May 2014.

Gell, P.A. & Reid, M.A. (2014). Regional-scale Transitions in Diatom Assemblages in response to human impact across the Murray River Basin, South-east Australia. *International Diatom Symposium, Nanjing*.

Gell, P., Reid, M., Grundell, R. & **Kattel, G.** (2014). Widespread Change in Ecological Character of Murray River Wetlands: Regime Shift or Species Turnover. *PAGES LUCIFS workshop, Leuven, Belgium*.

Graymore, M. and Schwarz, I. (2014). The role of Local Government in the transition to sustainable communities. Poster presented at *Regional Development Australia Conference 2014*, Albury, New South Wales, 15-17 October 2014.

Hansen, B. (2013). Does riparian condition influence breeding success in woodland birds in highly modified landscapes? *EcoTas2013*, November 2013, Aotea Centre, Auckland and the *Australasian Ornithological Congress*, December 2013, Unitec, Mt Albert, New Zealand.

Kattel, G.R. (2014). Potential of multi-proxy approach to detect human-induced disturbances on floodplain wetland ecosystems: A case of Kings Billabong, River Murray System (Australia). A paper presented in Australian Quaternary Association (AQUA) meeting (30 June- 3 July 2014), Mildura, Australia.

Kattel, G.R., Dong, X. & Yang, X. (2014). Cladoceran-inferred changes in large river floodplain wetlands of Australia and China. A paper presented in XIII Subfossil Cladocera Workshop (16-18, June 2014), Tallinn, Estonia.

Kattel, G.R., Dong, X. & Yang, X. (2014). Ecological and hydrological changes in floodplain wetlands of the Murray and Yangtze River systems. A paper presented in Australia-China Wetland Network Research Symposium (23-28 March, 2014), Nanjing, China.

Reeves, J., Tyler, J., Gouramanis, C. & De Deckker, P. (2014). Further stories from the 'rain gauge' of Western Victoria. *AQUA Biennial Meeting, Mildura*.

Shugg, A. & Dahlhaus, P. 2014. A model for the origin of carbonate mineral waters of central Victoria. International Multidisciplinary Conference on Mineral Waters. Carlovy, Czech Republic, September.

Research Engagement

Dr Andrew Barton was a member of the technical Panel of the Office of Living, Victoria Living Ballarat Project, became a member of the Central Highlands Water and FedUni MoU committee, continues to provide expert advice and consults to the Victorian water industry and regularly reviews technical papers for about 10 different water resources related journals.

Dr. Jessica Reeves completed her reign as President of the Australian Quaternary Association and commenced a role as member of the National Committee for Earth Sciences. **Jessica** continues as the Federation University's councillor to AINSE and member of the Geology and Archaeology Specialist committee.

Prof. Peter Gell is a member of the IGBP PAGES Scientific Steering Committee and leads the PAGES working group Aquatic Transitions. **Prof. Peter Gell** took up his role as a member of the Scientific Steering Committee of the IGBP Project PAGES (Past Global Changes) and took part in the 2014 meeting in Paris in January. He is Associate Editor of a special issue of *Marine & Freshwater Research* around the contributions from the workshop "Ramsar Wetlands: Understanding Change in Ecological Character" held in Queenscliff, in November, 2013. **Peter Gell** continued his role on the Project Control Board of the Office of Living Victoria project *Living Ballarat*.

Dr Keely Mills is the Treasurer of the International Society for Diatom Research (2013-) and is guest editor of the special issue of *Climate of the Past* (emerging from the PAGES Young Scientist Meeting, Goa, India, 2013) entitled "The Past: A Compass for Future Earth?"

Dr. Peter Dahlhaus continued as a member of the Corangamite CMA Community Advisory Group and the Corangamite CMA Land Health Program Steering Committee. He also was a member of the technical Panel of the Office of Living Victoria Living Ballarat Project.

Dr Birgita Hansen has continued her role as Editor-in-Chief of *Stilt*, the international shorebird journal of the East Asian-Australasian Flyway. In this role she has continued her membership of the Australasian Wader Studies Group committee. **Birgita** represented South Beach Wetlands and Landcare Group, and BirdLife Australia, at the Victorian Civil and Administrative Tribunal in early 2014 as an expert witness in relation to an urban development proposal for the Powling Street wetlands in Port Fairy.

Dr Michelle Graymore has continued on the editorial board for the *International Journal of Sustainable Society*. She also completed her time as a member of the Great South West Sustain our Natural Assets Pillar Group, the Wimmera Mallee Sustainability Alliance.

Dr. Michelle Casanova was involved in numerous community roles including:

- Chair of the Glenelg Hopkins CMA River and Wetland Health Advisory Group (until June 2014)
- Member of the Winton Wetlands Scientific Advisory Group (From July 2014)
- Member of the Landcare Grant Assessment Panel for the Glenelg Hopkins CMA (Aug/Oct 2014)
- Member of the Climate Change Adaptation Panel for the GHCA (Sept. 2014)
- Department of Environment and Primary Industries, Victoria, workshop attendance to determine research priorities for Victorian wetlands (August 2014)
- Attendance at Streatham Fire Forum with Beyond Bolac Catchment Action Group (Sept. 2014)
- Attended at VVP endangered communities information session, Lake Bolac (2014).
- Editorial Board of *Ecological Management and Restoration* (2009-2014)
- Secretary of the Beyond Bolac Catchment Action Group (from Oct 2014)