

Preface

Most of what we know about the hydrological role of forests is based on paired catchment experiments. These experiments typically utilise a before-after-control-impact (BACI) design where two neighbouring forested catchments are jointly monitored during a calibration period of several years, after which one of the catchments is kept untouched as a reference (control), while the second is submitted to a forest treatment (impact). There are many variations in the design of these experiments, which may include multiple control and treatment catchments or comparative studies in the absence of a calibration period. Experimental catchments have produced a considerable amount of knowledge since the first true experiment was initiated over a century ago in the mountains of Colorado, USA. Despite the difficulties of maintaining long-term experiments, many are still operating today.

Revisiting Experimental Catchment Studies in Forest Hydrology was chosen as the theme for IAHS workshop HW05, held during 6–8 July 2011 in Melbourne, Australia, as part of the XXV General Assembly of the International Union of Geodesy and Geophysics (IUGG). The workshop gathered forest hydrologists from around the world, with the aim of revisiting experimental catchment results and promoting a renewal of international collaboration on this topic. This Red Book has been post-published and is divided into the following themes:

- **Addressing new questions using historical data sets** includes 14 papers that highlight the importance of experimental catchment studies in furthering our understanding of hydrological processes at a range of scales. Several papers present new modelling techniques and their application, while others explore issues such as forestry policy, climate change and ecohydrology. New techniques for evaluating forest cover and catchment characteristics using LiDAR and satellite imagery are also presented. Studies in this section incorporate data and modelling approaches from countries including Australia, New Zealand, South Africa, India, China, Malaysia, Spain, France and the USA.
- **Impacts of fires** includes three papers that variously describe the hydrologic impacts of wildfires and prescribed burning, as measured in experimental catchment studies in Australia and the USA. Issues such as drought, fire frequency and fire intensity are discussed in the context of effects on forest hydrology.
- **Water quality and sediment loads** includes three papers from the USA and Australia that outline the nature of sediment loads and water quality in forest catchments.
- **Ecosystem services** presents two papers that showcase the value and importance of experimental catchment studies for the valuation of forest “ecosystem services”, as well as the economic implications of afforestation and other changes in land use.

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