

EXHIBIT *77*

CURRICULUM VITAE
(2012)

BRUCE AYLWARD

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EXPERIENCE

2007 - present **ECOSYSTEM ECONOMICS LLC**

Bend, Oregon

Director. Carry out consulting and research for non-profits, government agencies, universities and other entities on the development and implementation of payment and market systems for the provision of environmental flows, ecosystem services and conservation of biodiversity (see individual assignments in Consulting below). Built business and client base to three-quarters of a million per year with four employees, two partners and a number of sub-contractors. As Managing Member built all administrative and financial systems to track and administer multiple ongoing engagements.

2007 - present **OREGON STATE UNIVERSITY – CASCADES CAMPUS**

Bend, Oregon

Instructor. Teach Agricultural and Resource Economics AREC-351 *Natural Resource Economics and Policy* to students in the Natural Resources program on an alternate year basis.

2002 - 2007 **DESCHUTES RIVER CONSERVANCY (DRC)**

Bend, Oregon

Water Bank Director (prior titles: DRC Program Director, Interim DRC Executive Director and Manager, Deschutes Water Exchange). Directed and managed project cycle for water conservation and banking in the Deschutes River (approximately \$1.5 million/year). Managed and mentored program staff (six) in the DRC's cooperative, market-based approach to conservation and environmental restoration. Partnered closely with irrigation districts, municipalities and tribes to meet instream environmental needs while securing supplies for agriculture and domestic uses in the face of rapid growth and demographic change in the basin. Directed the DRC's efforts to achieve reallocation of water in the Deschutes Basin through conservation, leasing, water banking and transfers. Developed new market tools and approaches including a groundwater mitigation bank and applications of auction and reverse auction techniques to price discovery in local water markets. Successfully worked to raise funds through grant writing, individual donor relations and lobbying for DRC Congressional funds.

2001 - 2002 **INDEPENDENT CONSULTANT**

Washington, DC

Environmental Economics, Policy and Institutions. Generated and carried out consulting contracts for clients, including the World Bank, the World Conservation Union, the World Commission on Dams, Forest Trends, the International Institute for Environment and Development, the International Centre for Environmental Management, and the Panamanian National Component of the Mesoamerican Biological Corridor (see Consulting below).

- 1999 - 2000 **SECRETARIAT OF THE WORLD COMMISSION ON DAMS (WCD)**
Cape Town, South Africa
Senior Advisor, Development Economics and Policy. Coordinated Commissioner and Secretariat inputs into the five chapters that formed the WCD Global Review of Large Dams, as part of the Commission's final report *Dams and Development: A New Framework for Decision-Making*. Led work on WCD Strategic Priority on Compliance as part of Secretariat Team developing principles, criteria and guidelines for options assessment and the development of new dams. Directed a number of WCD knowledge base activities including the thematic reviews "Financial, Economic and Distributional Analysis of Large Dams" and "International Trends in Project Financing;" the Crosscheck Survey (of 125 large dams); and the WCD Case Study of the Tucuruí Dam in Brazil. Also initiated and supervised a review of the literature on the economic costs and benefits of dams and provided guidance and oversight on the economic and distributional components of the WCD Case Studies.
- 1999 **IWOKRAMA INTERNATIONAL CENTRE FOR RAINFOREST CONSERVATION AND DEVELOPMENT**
Georgetown, Guyana
Senior Management Team, Principal Economist and Director of Information and Communications Programme. As member of senior management team, led program development in GIS, Information Technology and Communications Units, including staff hiring, evaluation and supervision, equipment purchasing and budget supervision. Worked closely with Financial Services Unit to restructure accounting system to accommodate Centre's work plan, donor project mix and business lines. Initiated an economics research program in sustainable forest management including analysis of valuation of low-impact forestry, ecotourism, watershed management, non-timber forest products and assessment of mechanisms for capturing these values. Developed information management systems and pricing structure for ecotourism operation and associated merchandising.
- 1997 - 1998 **INDEPENDENT CONSULTANT**
Portland, Oregon
Generated and carried out consulting contracts for clients, including the World Bank, International Institute for Environment and Development, and the Tropical Science Center (see Consulting below).
- 1990 - 1996 **INTERNATIONAL INSTITUTE FOR ENVIRONMENT AND DEVELOPMENT (IIED)**
London Environmental Economics Centre/Environmental Economics Programme
London, United Kingdom and San José, Costa Rica
Research Associate - Environmental and Resource Economist
Fundraising and New Business
 - Raised funds for research projects and attracted consulting and training assignments.
 - Obtained funding and organized the implementation of outreach activities, including workshops, working papers, articles and video production.*Management, Organizational and Interpersonal Skills*
 - Supervised all personnel, administrative and financial functions for multi-year research project.
 - Coordinated methodological design for a project involving 24 sub-studies and inputs from a team of 18 economists and natural scientists.
 - Orchestrated production of outputs by partner organizations as part of collaborative projects.
 - Successfully directed a participatory, dispute resolution process that brought ranchers, industry, government and environmentalists together and launched follow-up activities.*Research and Consulting*
 - Investigated controversial natural resource and environmental issues using methods such as survey design, database management, spreadsheet modeling, statistical and econometric analysis and GIS modeling.

- Valued natural resources and environmental services using production methods, contingent valuation method, travel cost method, stumpage values and opportunity cost approaches.
- Evaluated private and public sector investment decisions using financial and economic cost-benefit analysis and derived discount rates, consumption rates of interest and shadow cost of capital.
- Applied microeconomic theory to assess sector and product specific policies, legislation and regulations and their impacts on production and allocation of natural resources and environmental services, as well as investigated potential market failures, transaction costs and institutional solutions.

Capacity Building, Training and Public Speaking

- Taught short courses and participated in workshops/seminars/conferences on environmental and resource economics, cost-benefit analysis and the valuation of non-market goods and services.
- Assisted partner organizations in developing individual and institutional capacity to undertake research and to formalize institutional and inter-institutional relationships.

1988 - 1990

FLETCHER SCHOOL OF LAW AND DIPLOMACY

Tufts University, Medford, Massachusetts

Research and Teaching Assistant. As researcher on US Agency for International Development studies, critiqued the use of econometric techniques to determine the impact of military expenditures on economic development and composed fisheries sector report analyzing linkages between macroeconomic policy reform and natural resource use in Africa. Taught microeconomics, agricultural economics and computer software packages to graduate students.

1989

UNITED NATIONS ENVIRONMENT PROGRAMME (UNEP)

Nairobi, Kenya

Intern. (1) Energy Unit: Contributed section on global trends in energy production and consumption to an interagency paper on energy and environment. Drafted brief for Director on environmental impact assessment methodologies. (2) Center for International Development Institutions on the Environment (CIDIE): Designed mechanism for coordinating the sharing of environmental information between CIDIE members (environmental departments of the major multilateral donor agencies).

1988

BENHAM FINANCIAL MANAGEMENT GROUP

Palo Alto, California

Database Programmer. Created, wrote and tested a Dbase applications program ensuring timely compliance with regulations governing the registration of mutual funds in all fifty states. Audited the company's compliance files and reported to senior management.

1985 - 1987

US PEACE CORPS/REPUBLIC OF TANZANIA, MINISTRY OF NATURAL RESOURCES

Mufindi, Tanzania

Aquaculture Extension Officer. Provided technical expertise on the construction, management and harvesting of fish ponds to local villagers and the Agriculture and Livestock Division of the Mgololo Paper Mill. Obtained funding from the US Ambassadors Self-Help Fund used to introduce a fast-growing species of fish to three regions of southern Tanzania.

1984 - 1985

MENUWARE, INC.

Woodside, California

Technical Support Manager, Database and Marketing Coordinator. Established manual and computerized systems for all administrative data entry and reporting tasks. Responded to customer inquiries and tested and debugged MenuWare products. Wrote manuals, tutorials, specification sheets and advertising copy.

EDUCATION FLETCHER SCHOOL OF LAW AND DIPLOMACY, TUFTS UNIVERSITY**M.A. 1991, Ph.D. 1998****Fields of Study:** International Energy and Resources; Development Economics; International Trade and Commercial Policies; and International Monetary Theory and Policy**Dissertation:** "Economic Valuation of the Downstream Hydrological Effects of Land Use Change: Large Hydroelectric Reservoirs"**AUBURN INTERNATIONAL CENTER FOR AQUACULTURE****Auburn, Alabama. Peace Corps Training 1985.** Two-month intensive experiential course in warm water aquaculture and extension techniques.**STANFORD UNIVERSITY****A.B. in Human Biology 1983****Concentration:** Energy and Environmental Policy and Planning**THESIS-DISSERTATION COMMITTEES**

Lieberherr, Eva. 2008. Acceptability of Market-Based Approaches to Water Management: An Analysis of the Deschutes Groundwater Mitigation Program. Thesis. Master of Science. Oregon State University. Awarded 2008 Water Resources Specialty Group M.S. student at the annual meeting of the Association of American Geographers in and nominated for Oregon State University's 2008 Distinguished Master's Thesis Award.

Garrick, Dustin. 2010. Explaining Institutional Diversity in Emerging Markets for Environmental Flows: A Transactions Costs Approach to Comparative Policy Evaluation in the Columbia Basin. Doctoral dissertation. Department of Geography. University of Arizona.

Burright, Harmony. 2012. Beyond "Random Acts of Conservation:" An institutional analysis of the Natural Resource Conservation Service's Agricultural Water Enhancement Program. Thesis. Master of Science. OSU.

PROFESSIONAL AND CIVIC ACTIVITIES

Advisory Committee, 10th International RiverSymposium, and Environmental Flows Conference

Ad Hoc Committee and Director of Political Action Committee opposing City of Bend Surface Water Improvement Project (SWIP)

Adjunct Professor, Water Resources Graduate Program, Oregon State University

Oregon Administrative Rules Advisory Committees (various), Oregon Water Resources Department

Sewer Infrastructure Advisory Group, Water Rates Advisory Group, Bend 2030 Visioning Task Force, City of Bend

Katoomba Group on Ecosystem Services, Forest Trends

AWARDS AND ACHIEVEMENTS

Winner (as part of SWIP committee) of 2012 Source Weekly "Democracy in Action" award

Winner (as Millennium Ecosystem Assessment author) of Zayed International Prize for the Environment

Citicorp Wriston Scholarship for excellence in economics and business coursework, Fletcher School

LANGUAGES Professional Spanish and general proficiency in Swahili and French**SOFTWARE** Word, Excel, PowerPoint, Access, Quicken, IDRISI, ArcView, and SPSS

MAJOR CONSULTING AND RESEARCH PROJECTS by year and funding organization or client

- 2012 - present **Bonneville Environmental Foundation (BEF)**. Carry out *capacity strengthening for environmental water transactions* in the Colorado River Basin under a grant obtained from the Walton Family Foundation. Prepare transactional strategies with Walton grantees – Colorado Water Trust, Trout Unlimited, High Country Citizen’s Alliance and The Nature Conservancy – for the Gunnison River Basin (Colorado) and the Verde River (Arizona). Develop financing and accounting structure for an agreement between BEF and the Colorado River Delta Water Trust (Mexico) to develop Water Restoration Certificates from water acquisitions in the Mexicali water market. Carry out diagnostics on institutional coordination and policy reform for transactional performance in Colorado and Arizona. Revise and expand water transactions manual and teach short course. Attend NASA/Water Education Foundation/EDF conference on remote sensing and applications to water management.
- 2012 - present **Umatilla Basin Water Commission**. Worked with the Commission to prepare and obtain a Bureau of Reclamation WaterSmart challenge grant for *water marketing in the Umatilla Basin* (Oregon). Provide economic, marketing and technical advice for pilot transactions. Design brokerage and banking system for the Commission to increase agricultural efficiency/output and restore stream flow. Identify potential market supply and demand, assess willingness to pay, transaction costs and willingness to accept to characterize likely market activity. Develop flow charts and financial models for nascent water marketing opportunities between agricultural interests and between agricultural and environmental interests. Develop two-way auction process for the temporary trade of storage or natural flow water rights and apply to innovative pilot transactions.
- 2009 - present **National Fish and Wildlife Foundation (NFWF)**. Develop and implement land and water acquisitions and provide technical guidance on modeling, conveyance agreements and pilot stewardship and agricultural projects to the *Walker Basin Restoration Program* (Nevada/California), a \$206 million congressionally-authorized (Public Law 111-85) restoration project authorized through the Bureau of Reclamation. Facilitate regular meetings of a water technical group for presentation of research and modeling results to academic, agency, tribal and stakeholder groups working in the basin. Liaise with University of Nevada Reno and Desert Research Institute scientists on the development and practical application of a Decision Support Tool that combines rainfall-runoff, MODSIM water distribution and MODFLOW surface and groundwater interaction modeling. Provide technical and negotiation support to a Lower Walker River Conveyance Agreement between NFWF and the Walker River Paiute Tribe for conveyance of acquired water through the Reservation and on to Walker Lake. Provide water right, hydrological and economic support to water leasing and acquisition efforts, as well as to the design of pilot sustainable agriculture projects.
- 2008 - present **Washington Water Trust (WWT)**. Assessed feasibility and carried out institutional design for a *Dungeness Water Exchange*, including developing groundwater mitigation plan with Clallam County and Washington Department of Ecology. Worked with Local Leaders Group – including Clallam County, Dungeness Water Users Association, Jamestown S’Klallam Tribe, City of Sequim and Washington Department of Ecology to develop multi-criteria analysis for coarse screening and cost-benefit analysis for ranking groundwater mitigation and stream flow restoration alternatives. Developed mitigation demand and supply scenarios to inform local and state policy with respect to the Dungeness Instream Rule (WAC 173-518) and the Dungeness Water Exchange. Negotiate initial seed transaction of water rights between WWT and the Water Users Association.

- 2007 - present **NFWF**. Provide *capacity-building, strategic advice and networking services for the Columbia Basin Water Transactions Program* – a program of Bonneville Power Administration that promotes market-based transactions for stream flow restoration across Oregon, Washington, Idaho and Montana through \$6 million in annual investments. Developed a water transactions curriculum for NFWF and the eleven Pacific Northwest non-profits and state agencies practitioners involved in the program. Prepared a manual and teach the 3-day training course annually. Organized agenda and presentations for twice-yearly Program meetings aimed at training, exchange and strategy development for the program. Locate and initiate external professional contacts to assist program participants in promoting the Program at meetings and conferences, as well as increasing the understanding by water resources professionals of the transactional approach to instream and environmental flows. Trouble shoot strategic issues as they arise. Assessed program monitoring and evaluation needs through workshops and meetings, prepared annual program compliance monitoring reports and assisted with development of program effectiveness accounting framework.
- 2011 - 2012 **Environmental Defense Fund (EDF)**. Partnered with Stillwater Sciences on an assessment of ecosystem services and *economic valuation of the economics of meadow restoration* projects in the Sierras. Gathered existing research on hydrogeologic function of meadows and developed pre- and post-restoration scenarios for on-site productivity and downstream flow regime and suspended sediment. Quantified and valued these services for a “typical” meadow and then conducted sensitivity analysis to examine range of potential results. For both financial and economic models, examined implications for landowner and societal (public) incentives to invest in meadow restoration.
- 2009 - 2012 **The Nature Conservancy (TNC)**. Worked with Arizona State chapter representatives to prepare scope for an economic study of the *stream flow values of the Verde River*, Arizona. Assisted in the design of a questionnaire on water to be administered by a polling firm to residents of the Verde Valley. Reviewed economic study and participated in meetings with local politicians and other stakeholders to present and discuss the results of the study. Based on existing stream flow campaigns and information from TNC staff on irrigation diversions in the Valley, developed a stream flow simulation tool linked to components of the irrigation water budget and capable of simulating potential conservation projects.
- 2010 - 2011 **NFWF**. Under a cooperative agreement with US Fish and Wildlife service and in partnership with the US Bureau of Reclamation assessed existing agency instream flow acquisitions and provided a design for a *Central Valley Water Transactions Program*.
- 2009 - 2011 **Oregon Business Council**. Facilitated meetings of CEOs and key stakeholders on the Business Council’s Water Policy and Markets Working Group. Through meetings developed consensus around the vision, objectives and metrics for a *new vision for water management in Oregon*. Prepared and revised a Vision white paper for the Council.
- 2009 - 2011 **Ministry of Forestry, Belize**. Provided overall leadership and project management on a *valuation of the ecosystem services of the Maya Massif*, an area formed by multiple conservation areas that cover the majority of the highlands of southern Belize. Co-led final workshop on the project with Ministry and NGO staff in Belmopan.
- 2008 - 2011 **BEF**. Provided technical advice to BEF on the *development of a voluntary market tool for stream flow restoration*, the Water Restoration Certificate (WRC). Researched and developed the criteria for use in assessment of potential WRCs. Prepared a white paper on Water Restoration Certificates that sets the WRCs in the context of other ecosystem service market tools. Carried out scoping analysis for basins in different states and basins, including detailed inventory of potential projects in New Mexico at the request of Intel.
- 2009 - 2010 **UN Food and Agricultural Organization (FAO)**. At request of Water Policy group and in collaboration with Westwater Research LLC, developed an *analysis of the value of water* that compared economic productivity studies with emerging water market pricing from the western US and Australia.

- 2008 - 2010 **Institute of Natural Resources, Oregon State University.** Prepared research questions and a grant for research on the *financing of ecosystem services projects to support rural sustainability* that was funded by the Bullitt Foundation. Supervised collection of perspectives from financing and ecosystem service professionals and then co-led a workshop that gathered professionals with academics, agency staff and NGOs to discuss challenges and opportunities in project financing. With the Central Oregon Intergovernmental Council, prepared detailed report on ecosystem services in Central Oregon, including diagnostic of key services, description of existing financing mechanisms, and exploration of potential pilot opportunities.
- 2005 - 2010 **FAO.** Technical editor and chapter author for FAO/World Health Organization book on *water law and management* (see publications list below).
- 2009 **FAO.** As part of a Global Environmental Facility transboundary diagnostic analysis (TDA), worked with hydrologists and socio-economists from Angola, Namibia and Botswana (and South Africa) to carry out an *economic assessment of water use for municipal, irrigation and environmental uses in the three OKACOM countries*. The results were used to show how different water resource development scenarios – largely in the upstream countries - affected the economy of each of the three countries, as an input to OKACOM discussions on the TDA.
- 2008 - 2009 **NWFS Consultancy and Govt. of Mauritius.** Team member of a larger NWFS Consultancy project aimed at establishing a protected area category in Mauritius for “environmentally sensitive areas.” Researched existing and related policies and legal frameworks in the country and prepared a white paper for the establishment of a *National Policy for Environmentally Sensitive Areas*.
- 2007 - 2009 **NFWF.** Collaborated with NFWF, TNC and Oregon agencies and non-profits working on flow restoration for a project entitled: *Oregon Water Law and Flow Restoration*. The project consisted of a review of accomplishments and issues surrounding 20 years of implementation of the 1987 Oregon Instream Water Rights Act. Compiled and analyzed data regarding water rights reallocation to instream use since the Act was passed. Interviewed stakeholders, quantified performance and transaction costs, and identified lessons learned for the Conserved Water Program. Assessment of progress in Oregon made with leasing and transfers as a tool in instream flow restoration.
- 2008 **Institute of Natural Resources, Oregon State University.** Lead writer on a review and analysis of key challenges to *establishing ecosystem service credit markets in Oregon*. Participated in series of workshops to identify and discuss issues and then prepared an *Ecosystem Services Playbook* reporting on the findings of the workshops.
- 2007 - 2008 **Friends of the Teton River.** Developed a *Teton River Water Transactions Strategy* and an initial plan for flow restoration activities in two major tributaries aimed at restoring Yellowstone Cutthroat Trout. Consultations with agencies and water users in the Teton River valley along with analysis of hydrological and water right data to identify transactional opportunities and near term steps to initiate the program.
- 2007 - 2008 **World Conservation Union (IUCN).** Supervised work on a study entitled *Review of Innovative and Sustainable Funding Mechanisms for Coastal and Marine Ecosystems*, which was part of the Mangroves for the Future (MFF) project, in which Indian Ocean countries affected by the 2004 tsunami are collaborating on improved coastal and marine ecosystem management. The project included preparation of a literature review on sustainable financing with issues papers on the role of voluntary/involuntary approaches, property rights, poverty, and partnerships, as well as a MFF strategy for sustainable financing.

- 2007 **Bradley Fund for the Environment and Commonwealth of Australia.** Along with WaterFind Environmental Fund and NFWF, developed and led an *international seminar on water transactions for the environment*. Initiated concept, developed program, invited panelists, moderated day-long event and edited proceedings of a workshop examining lessons learned and future prospects for environmental water transactions. The panel was held as part of International Riversymposium, in Brisbane, Australia, and featured an exchange of experiences between practitioners from the Columbia Basin in the US and southeastern Australia (particularly the Murray-Darling Basin).
- 2007 **FAO.** Prepared a consultancy report on the prospects for *developing payment for watershed service schemes* that link payments by users of domestic water supply with improved environmental management and water quality from agricultural landscapes. Assessed potential for such schemes to take hold in the context of Sub-Saharan Africa.
- 2005 - 2006 **US Department of Interior, Water 2025 Program.** As part of a half-million-dollar effort by irrigation districts, tribes, cities and conservation groups, led planning studies to examine demand and supply of water resources in the upper Deschutes River Basin and develop scenarios for the use of market-based stream flow restoration alternatives to meet ecosystem, community and agricultural needs to 2025. Negotiated agreements with irrigation districts for a joint buying and redistribution program for basin water rights under the Central Oregon Water Bank.
- 2002 - 2005 **Millennium Ecosystem Assessment (MA).** Served as Convening Lead Author for the Freshwater chapter of the Responses Volume. Compiled and assessed economic responses that promote environmental services and biodiversity associated with freshwater. Participated in MA meetings and review process.
- 2002 - 2003 **City of Bend, Oregon.** Co-authored *assessment of city's water needs, water supply options and groundwater mitigation alternatives*. Included evaluation of water supply and mitigation alternatives, development and use of selection criteria for ranking and choosing alternatives, evaluation and cost/benefit analysis of conservation opportunities including water reuse.
- 2001 - 2003 **World Bank.** Provided technical assistance to the Costa Rican Environment Ministry, the National River Basin Network and the Municipality of Sarapiquí in developing terms of reference for the building of the Network and the Ministry's capacity and the development of a participatory, *multi-stakeholder river basin diagnostic and management plan in Sarapiquí*. In Sarapiquí (and Costa Rica more generally) conflicts over public/private roles in water planning and between local/national interests have led to an impasse between preservation and development. As a contribution to resolving this situation the consultant's role was to work with the parties involved to develop practical technical studies and institutional arrangements that can be financed by national and international organizations and implemented by the Network, the local Commission for Follow-up to the Referendum on the conservation of the Sarapiquí River, the Organization of Tropical Studies and other potential partner organizations.
- 2001 - 2003 **IIED.** Supervised a literature review of the experience with *markets for environmental services within Costa Rica*. Supported the development of a study proposal to the Global Environment Facility (GEF) for original research into the economic, social and institutional issues associated with the development of such markets within the country.
- 1999 - 2003 **World Bank Research Committee.** Provided overall guidance and leadership in the development and implementation of research and work plans for a study entitled *The Contribution of Nature Tourism to Conservation Finance and Economic Development*, a case study undertaken in KwaZulu-Natal, South Africa. Developed and carried out policy analysis study component that integrates results from a multi-market demand-studies with supply-side analysis of nature tourism producers, analysis of linkages between tourism and ecological damage and the economic impacts emerging from a social accounting matrix. Was responsible for coordinating and writing a compiled volume of the findings of the sub-studies and policy analysis.

- 2001 - 2002 **AusAid and other bilateral donors.** Natural resource economist on a project entitled *Critical Review of Protected Areas in the Lower Mekong River Region and their Role in Socio-Economic Development*, an international review of protected area management in the four countries of the lower Mekong led by the International Center for Environmental Management and involving a number of government agencies, conservation organizations and international donors. As input to the regional review, authored a “lessons learned” paper on incentives for protected area management. As part of the Vietnam country study team, was responsible for framing and implementing a provincial level (Hue province) study of the economic role of protected areas in the regional economy and deriving lessons for policy and institutional responses.
- 2001 - 2002 **World Bank.** As a specialist in environmental services and natural resource economics, provided technical assistance in the *preparation of Integrated Natural Resource Management in the Highlands of Guatemala*, a \$40 million World Bank loan project. Provided guidance on the development of national programs and the project’s Component on Environmental Services through presentation of a comprehensive conceptual framework for the application of market mechanisms to incentive problems associated with environmental services and a review of the international experiences with these mechanisms (in paper form and through a workshop with the National Inter-institutional Group on Environmental Services). In collaboration with the national team identified pilot programs consisting of targeted services and applicable mechanisms/strategies for valuation and implementation, and revised tasks and budget under this component. Also, was responsible for revising the economic analysis of the entire project as part of the Bank’s project evaluation mission.
- 2001 **World Bank.** Designed, organized and co-taught with World Bank staff a one-week **course on economic valuation of environmental services** and market mechanisms for promoting the conservation of ecosystem services. Course was sponsored by the Panamanian Ministry of Agriculture and offered to local academics, consultants, agencies and non-profits. Coordinated conceptual and organizational development of course outline, writing of a 40-page substantive guide to the course and preparation of Powerpoint presentations for the course (all in Spanish).
- 2001 **WCD.** As part of roving team of ex-Secretariat staff gave presentations, participated in meetings, workshops and the Final WCD Forum meeting, and worked to develop agency and national follow-up processes on the Commission’s final report *Dams and Development: A New Framework for Decision-Making*, including the Aspen Institute’s Dialogue on Dams and Rivers, Panamanian National Workshop, Mesoamerican Regional Workshop, US National Hydropower Association Meetings, US EximBank, Inter-American Development Bank, the World Bank Group, and United Nations Environmental Programme Financial Services Initiative, as well as country briefings in Brazil, Argentina and Chile.
- 1999 - 2001 **World Bank.** Consultant on the preparation phase for a proposed World Bank/Ministry of Agriculture project to implement Panama’s Law 21 regarding *watershed management in the Panama Canal Watershed*. Drafted overall economic and policy framework and Terms of Reference for preparation phase studies, supervised the hydro-economic analysis of alternative land uses in the watershed and prepared a strategy paper for the Bank incorporating the results of the different preparation studies. Developed concept for a pilot system of payments for environmental services, supervised analysis (using GIS) of indicators in order to establish priority areas and resource needs for the pilot program, and defined further environmental and economic information needs of the project, including coordinating tasks and budget for additional grant resources to finalize project preparation.
- 1998 **World Bank Research Committee.** Developed analytical framework for assessment of policies aimed at improving *nature tourism’s contribution to conservation finance and economic development*. Coordinated inputs from research team members in initial phase of study in Southern Africa and produced case study proposal and work plan for submission to the Committee that was subsequently approved for the largest funding commitment made by the Committee.

- 1997 - 1998 **World Bank and Inter-American Institute for Cooperation in Agriculture/Natural Resources Agency.** Natural Resource Economist for preparation phase of \$10 million *Panamanian Atlantic Biodiversity Corridor Project* for the World Bank and GEF. Used GIS calculated deforestation rates and threats to the components of the Corridor. Evaluated the environmental benefits (ecotourism, bioprospecting, watershed conservation, carbon sequestration and existence values) and productive uses under a conservation land use scenario and a traditional development scenario. Calculated incremental costs of biodiversity conservation to justify project financing under GEF criteria. Prioritized project investment in particular components employing information on conservation benefits and opportunity costs. Shared responsibility for drafting, and led consultative workshop on the logical framework for the Project. Assisted in project budgeting and participated in the World Bank pre-evaluation mission.
- 1997 **Fundación de Parques Nacionales, Costa Rica.** Senior consultant for a Tropical Science Center study aimed at identifying factors affecting the *success or failure of participatory sustainable development projects in, or near, protected areas*. Provided conceptual framework of the linkages between conservation, development and participation. Selected sustainability criteria and developed linkage between identified success/failure factors. Organized factors by criteria and assisted field researchers with questionnaire design for a case study of projects. Shared final report-writing duties.
- 1996 - 1997 **United Nations Development Program (UNDP).** Senior advisor for a *rapid economic assessment of the Guanacaste Conservation Area* carried out by the Tropical Science Center. Designed conceptual approach underlying the valuation sub-studies. Identified potential ecotourism and existence values for a valuation exercise employing the contingent valuation method in and outside of the conservation area. Supervised questionnaire design and application, and critiqued results. Calculated economic benefits of carbon fixation/storage and bioprospecting. Supervised collection and analysis of cost data for the conservation area. Wrote and edited sections of final report.
- 1995 - 1996 **UK Overseas Development Administration (ODA).** Lead co-consultant on a *training program in environmental economics* carried out for staff of the Watershed Management Unit of Chile's Corporación Nacional Forestal (CONAF) by ERM, Ltd. Instructed thirteen CONAF staff in a short-course on environmental economics, cost-benefit analysis and valuation techniques. Subsequently, co-led additional workshops in which staff case studies were designed, developed, and reviewed. Provided theoretical and methodological guidance to seven case studies of watershed management in different regions of the country.
- 1994 - 1996 **ODA.** Led UK inputs to a project run by the Natural Resources Institute entitled *The Economic Benefits of Watershed Protection and Trade-offs with Timber Production in Peninsular Malaysia* as part of the Malaysia-UK Forest Conservation and Development Programme. Project undertaken in conjunction with economists from the Universiti Pertanian Malaysia and hydrologists from the Forest Research Institute of Malaysia. Reviewed study proposal and provided technical assistance and methodological guidance on the valuation research. Identified relevant UK expertise (hydrology and economics) and training needs of Malaysian counterparts. Coordinated inputs on paper summarizing land use issues and policies related to forestry and watershed management in Malaysia. Reported on research and financial status of project to NRI.

- 1993 - 1996 **Ministry of Foreign Affairs, Netherlands.** Project Manager and lead investigator for a multi-year study on *economic incentives for watershed protection*, a project undertaken in Costa Rica with collaboration of the Tropical Science Center and the Masters Program in Economic Policy of the National University. Conceived project idea, and developed project proposal and work plan. Managed all personnel, administrative and financial functions from the project office in Costa Rica. Coordinated methodological design for the research program (24 sub-studies) and inputs of a research team of 18 economists and natural scientists. Personally conducted the following research work: literature review and annotated bibliography on watershed management, land use survey, full financial and economic cost-benefit analysis of livestock and dairy production, analysis of social discount rates in Costa Rica and statistical analysis of erosion/productivity relationship. Developed theory and methodology, and calculated the external effects of land use change on local hydrology and downstream hydropower generation. Participated as team member in estimation of secondary forest productivity, spatial modeling of erosion and sediment transport modeling and analysis of institutional arrangements for improving watershed management. Guided design and supervised the progress of additional sub-studies including valuation of water for use in irrigation, assessment of the economic costs of protected area management, soil sampling, and field experiments on rainfall interception and horizontal precipitation. Designed and carried out the capacity building component of the project. Developed and supervised the production and dissemination of a working paper series in Spanish (eleven publications, 600 pages) and a project video. Oversaw development of project steering committee and raised funds for a workshop to present project results to a regional audience of experts and practitioners.
- 1995 **British Council/Asian Development Bank.** Specialist on biodiversity commercialization on a technical assistance project entitled *Institutional Strengthening for Biodiversity Conservation*. Conducted financial analysis of non-timber forest products, derived guidelines for assessing economic viability of biodiversity commercialization, and assessed the relevance of activities underway at Costa Rica's National Biodiversity Institute for biodiversity conservation in Indonesia.
- 1992 - 1994 **World Wildlife Fund International (WWF).** Team member on Sustainable Agriculture Programme project entitled: *The Hidden Harvest: The Role of Wild Foods in Agricultural Systems*. Participated in design of research into methods for integrating environmental valuation techniques with participatory rural appraisal techniques - as applicable in the case of valuing the contribution of wild foods to the livelihoods of rural people. Wrote papers that describe contingent valuation and cost-based valuation methods and their application to foods harvested from the wild.
- 1991 - 1993 **Swedish International Development Agency.** Team Leader for a project entitled *The Economic Value of Species Information and its Role in Biodiversity Conservation: Case Studies of Costa Rica's National Biodiversity Institute (INBio) and Pharmaceutical Prospecting*. Developed proposal, organized the research agenda, hired and supervised consultants, and managed the budget. Conducted detailed study of incentive and valuation issues involved in the use of naturally occurring substances in pharmaceutical R&D. Assisted consultants in an economic analysis of INBio, including assessment of potential economic benefits and costs of inventorying biodiversity and developing potential uses of the resulting database of species information. Compiled project final report.
- 1992 - 1993 **ODA.** Team member for study of the *economics of tropical forest land use options*. Reviewed literature on the valuation of marketed and non-marketed goods and services of tropical forests and contributed sections on valuation methodologies. Conducted site visit to Brazil and developed initial ideas for a collaborative research project on the theme that subsequently received funding, as the second phase of the study.
- 1992 - 1993 **International Tropical Timber Organization.** Team member on study of the *economic linkages between the international trade in tropical timber and the sustainable management of tropical forests*. Gathered and analyzed data on the trade in tropical timber, and assessed market and policy failures affecting forest management in producer countries.

- 1992 **ODA.** Economist for an *environmental assessment of the Kilombero Valley Hardwood Project*, a proposed Commonwealth Development Corporation's project in Tanzania. Developed framework for an “extended” cost-benefit analysis and analyzed labor, land compensation, natural forest management issues in conjunction with the proposed 35,000 ha teak plantation and natural forest management project. Carried out consultancy as part of an interdisciplinary, collaborative effort involving staff from both IIED and the Institute for Resource Assessment of the University of Dar Es Salaam.
- 1991 - 1992 **Organization for Economic Cooperation and Development.** Team member on case study of the *environmental effects of trade in the forest sector*. Participated in overview of global forest resources, reforestation, deforestation and ownership as part of an examination of the contribution of trade to overexploitation and the use of trade liberalization/controls in promoting sustainable production in the forestry sector.
- 1990 **US Agency for International Development (USAID).** Team member for a study of the *impact of military expenditures on economic development*. Reviewed published work in which quantitative methods were used to identify and assess the determinants and impacts of military expenditures in developing countries. Critiqued the statistical methods employed and evaluated the relative reliability of results obtained in multivariate analyses. Contributed section on the relevance of econometric analysis to the understanding of the determinants of public expenditure across broad cross-country samples.
- 1988 - 1989 **USAID.** Wrote a *case study on artisanal fisheries in Niger* for a study analyzing linkages between macroeconomic policy reform and natural resource use in Africa. Emphasized the differences between common pool resources and public/private goods, and the implications for small-scale fishery management and policy regarding federal involvement in fishery monitoring and regulation.

SHORT CONSULTANCIES/RESEARCH PROJECTS with contracting institution

- 2012 **NFWF.** Under a grant from the Walton Family Foundation, carried out evaluation mission to Mexicali and supervised team’s evaluation of the Colorado River Delta Water Trust’s (Mexico) efforts to acquire water rights for use in ecological restoration of the river and delta.
- 2012 **NFWF.** Under a grant from the Walton Family Foundation, participated in Western Water Transaction Workshop and led development of workshop session on outreach for water transactions.
- 2011 – 2012 **Walton Family Foundation.** Developed a strategic framework for economic incentives and financing for flow restoration with respect to the Colorado River.
- 2010 – 2012 **IIED.** Carried out literature review on active ecosystem services credit programs in developing countries. Contributed to a lessons learned paper on monitoring and evaluation of such schemes.
- 2010 - 2011 **NFWF.** Prepared chapter on water markets and environmental flow transactions for an assessment of market-based responses to Arizona’s water scarcity problems under a grant with the Walton Family Foundation.
- 2010 - 2011 **DRC.** Investigated financing opportunities for a groundwater mitigation bank on the Deschutes River in Oregon.
- 2010 **FAO.** Prepared a paper on benefit-sharing and water resources based on a case study from the Okavango River Basin for a SADCC Workshop on Benefit Sharing.
- 2010 **WWT.** Assisted Nisqually Tribes with a feasibility assessment for a water bank in the Nisqually watershed.
- 2009 - 2010 **FHB Consulting Services.** Provided technical assistance to ecosystem services proposal effort by Whatcom County Natural Resources Committee (Washington). Addressed workshop regarding lessons learned with instream flow transactions.

- 2009 - 2010 **UNDP**. Supervised literature review of ecosystem management and resulting downstream hydrological services and prepared summary chapter for a UNDP volume aimed at Latin American policymakers on mainstreaming biodiversity and ecosystem services.
- 2009 - 2010 **WWT**. Worked with Walla Walla County to develop a series of instream flow transactional agreement templates for the Walla Walla Water Bank.
- 2009 **ONEMA (French National Water Agency)**. Invited to present keynote presentation on economic instruments at a European workshop on “Economic Instruments to Support Water Policy in Europe” held in Paris.
- 2009 **NFWF and The Freshwater Trust**. Prepared criteria and protocols for developing ecosystem service credits from instream flow transactions.
- 2008 - 2009 **TNC**. With WWF and IUCN, prepared and facilitated an international workshop on the “nuts and bolts” of flow reallocation at the international conference on environmental flows in Port Elizabeth South Africa.
- 2008 - 2009 **US WWF**. Examined environmental water acquisition opportunities on the Rio Grande below Elephant Butte Reservoir in New Mexico and Texas.
- 2008 - 2009 **World Business Council on Sustainable Development**. Prepared a report on ecosystem valuation for business Project with Environment Management Group.
- 2008 **Missouri River Natural Resources Committee**. Invited for plenary address to 2008 annual meeting of agencies working on Missouri River on topic of “Ecosystem Service Values and Economic Incentives: Tools for Ecosystem Restoration.”
- 2008 **WWF International**. Prepared a concept note on water offsets for a Dialogue on Water Neutrality hosted by WWF.
- 2008 **David Evans Consulting**. Contributed to a Water Exchange strategy for Walla Walla County (Washington).
- 2008 **IUCN**. Prepared briefing notes on the concepts of water markets, water marketing and water offsets.
- 2007 **IIED**. Prepared paper on efficiency and equity issues in contracting for watershed services for March 2007 Bellagio workshop.
- 2007 **IUCN**. Participated in international expert meeting on “Payments for Watershed Services: Building on pilot experiences to mainstream a tool for sustainable conservation and development” at Rockefeller Bellagio Conference Center, Como, Italy.
- 2007 **Swalley Irrigation District**. Preparation of a manual for Oregon irrigation districts on managing water rights and change, including leasing, conservation opportunities, exit fees and water banking.
- 2006 **Transfrontier Conservation Consortium**. Prepared pre-feasibility report on the costs and benefits of the Kavango-Zambezi Transfrontier Conservation Area, a five-country conservation partnership in Southern Africa. Outlined economic studies for feasibility phase of the project.
- 2006 **IUCN**. Reviewed chapter on types of payments and financing mechanisms for the IUCN Water and Nature Toolkit on payments for hydrological services of watersheds for water planners and river basin managers (“PAY”).
- 2006 **IUCN**. Prepared policy brief and case study examples summarizing the benefits of using economic incentives and market approaches in water management for Mediterranean Conference on Water Management in Drought Prone Areas
- 2005 **NFWS**. Economic evaluation of environmental impacts of a proposed road in eastern Mauritius and associated indirect mitigation costs for forest conservation. Analysis led to postponement of road project.

- 2002 **IUCN.** Authored the economic chapter on Environmental Flows project for Water and Nature Initiative.
- 2001 - 2002 **Forest Trends.** Created a proposal for an information clearinghouse on markets for environmental services with an initial emphasis on water services provided by ecosystem management. Supervised the development of a prototype website for the clearinghouse and launched an initial list serve on markets for water services.
- 2001 **Millennium Ecosystem Assessment.** Participated in the design workshop for the assessment in Cape Town, South Africa.
- 2001 **FAO.** Prepared a chapter on the valuation of hydrological services in Arenal, Costa Rica and assisted in the writing of another chapter on a voluntary contractual arrangement for internalizing hydrological externalities as part of a forthcoming FAO volume on market approaches to the provision of watershed services.
- 2001 **World Bank.** Prepared and presented an integrated approach to the use of economic valuation and institutional analysis in the derivation of incentive mechanisms and technical measures for watershed management to the Watershed Window workshop at the World Bank's Water Week.
- 1999 **FAO.** Prepared concept paper on issues involved in developing transfer payments for environmental services and the appropriateness of a regional approach to instituting such payments.
- 1998 **IIED/ODA.** Rewrote workshop paper and produced working paper on the study of trade-offs between timber production and watershed protection in Malaysia (see above).
- 1997 - 1998 **IIED/Ministry of Foreign Affairs, Netherlands.** Developed proposal and obtained funding for a series of publications (journal submissions and working papers) to be jointly authored with Costa Rican counterparts as a follow-up to the Economic Incentives for Watershed Protection project (see above).
- 1997 **ODA.** Reviewed country studies for a project run by IIED called *Policy that Works for Forests and People* with emphasis on economics and policy analysis content. Countries include Papua New Guinea, Pakistan, Zimbabwe, Ghana and Costa Rica.
- 1997 **Oxford University Press.** Reviewed a manuscript on establishing a biodiversity cartel aimed at capturing the value of traditional ethnobotanical knowledge by transforming it into trade secrets.
- 1997 **World Bank.** Reviewed and evaluated a research proposal on the economics of ecotourism prepared for the Bank's Research Committee.
- 1996 **Canadian Museum of Nature.** Taught module on the economics of biodiversity for the Museum's "International Summer School on Biodiversity and Systematics."
- 1996 **Placer Dome de Costa Rica, S.A.** Developed Terms of Reference for a cost-benefit analysis of different land use development options for the site of a proposed \$1 billion open pit mine.
- 1996 **ODA/Costa Rican Ministry of Environment and Energy.** Supervised consultancy to determine the value of environmental services provided by privately held tropical forests as an input to the incentives program called for under the Forestry Law of 1996.
- 1995 **UK Department of Environment.** Prepared case on the environmental impact of banana consumption in the UK and EU for IIED report on "Ecological Footprints," with particular reference to Costa Rica, trade preferences under the Lomé Treaty and the ECO-OK banana certification program.
- 1994 **INBio.** Revised and updated activity cost model for INBio.
- 1993 **UNEP - Interim Biodiversity Convention Secretariat.** Selected to participate in ad hoc group revising economics section of Biodiversity Country Study Guidelines.

- 1992 **UNEP - GEF**. Examined issues of cost-effectiveness and national/global benefits as a member of an Ad Hoc Working Group on Biodiversity for the GEF's Scientific and Technical Advisory Panel.
- 1991-1992 **UNEP**. Advised Ugandan and Polish study teams regarding the preparation of biodiversity country studies as Member of the International Advisory Team for the Intergovernmental Negotiating Committee for the Convention on Biological Diversity.
- 1991 **World Resources Institute (WRI)**. Reviewed the Biodiversity Strategy and Action Plan sponsored by WRI, IUCN and UNEP. Developed an agenda for social science research on biodiversity for the Plan.
- 1991 **World Conservation Monitoring Centre**. Contributed a number of sections to *Global Biodiversity Status of the Earth's Living Resources*, including assessment of international development assistance and biodiversity conservation, techniques for valuing biodiversity, and the valuation of agricultural genetic diversity, non-use benefits and ecotourism.

PUBLICATIONS

Books, Book Chapters and Journals

- Garrick, D., and B. Aylward. 2012. Transaction Costs and Institutional Performance in Market-Based Environmental Water Allocation. *Land Economics* 88(3): 536-560.
- Hartwell, R., and B. Aylward. 2012. Auctions of Water Rights. In *Aquanomics*, edited by B. D. Gardner and R.T. Simmons. Oakland: Independent Institute.
- Vapnek, J., B. Aylward, C. Popp and J. Bartram (eds). 2011. *Law for Water Management*. Rome: UN Food and Agriculture Organization and World Health Organization.
- Aylward, B., and C. Popp. 2011. Managing Water for Human and Ecosystem Needs: Emerging Approaches. In *Law for Water Management*, edited by J. Vapnek, B. Aylward, J. Bartram and C. Popp. Rome: FAO/WHO.
- Aylward, B., and C. Popp. 2011. Water Resource Quantity: Allocation and Management. In *Law for Water Management*, edited by J. Vapnek, B. Aylward, J. Bartram and C. Popp. Rome: FAO/WHO.
- Aylward, B., N. Petralli, J. Vapnek and B. Kiersch. 2011. Water Resources and their Management: An Overview. In *Law for Water Management*, edited by J. Vapnek, B. Aylward, J. Bartram and C. Popp. Rome: FAO/WHO.
- Aylward, B., and R. Hartwell. 2010. Sustainable Ecosystem Management and Water: the Benefits of Hydrological Services. In *The Importance of Biodiversity and Ecosystems in Economic Growth and Equity in Latin America and the Caribbean*. Panama: UNDP.
- Garrick, D., M. Siebentritt, B. Aylward, C. Bauer and A. Purkey. 2009. Water Markets and Freshwater Ecosystem Services: Policy Reform and Implementation in the Columbia and Murray-Darling Basins. *Ecological Economics* 69:366-379.
- Aylward, B., and D. Newton. 2006. Long Range Water Management in Central Oregon. *The Water Report*. 29:1-12.
- Calder, I., and B. Aylward. 2006. Forest and Floods: Moving to an Evidence Based Approach to Watershed and Integrated Flood Management. *Water International* 31(1): 87-99.
- Aylward, B., J. Bandyopadhyay and J.C. Belausteguigotia. 2005. Freshwater Ecosystem Services. In *Ecosystems and Human Well-being: Policy Responses, Volume 3*. Findings of the Responses Working Group of the Millennium Ecosystem Assessment. Edited by K. Chopra, R. Leemans, P. Kumar and H. Simons. Washington DC: Island Press.
- Aylward, B. 2005. Towards Watershed Science that Matters. *Hydrological Processes* 19(13): 2643-2647.
- Tognetti, S., B. Aylward and G. Mendoza. 2005. Markets for Watershed Services. *Encyclopedia of Hydrological Sciences*. John Wiley & Sons, Ltd.

- Aylward, B. 2004. Land Use, Hydrological Function and Economic Valuation. In *Forests, Water and People in the Humid Tropics*. Edited by M. Bonnell and L. A. Bruijnzeel. Cambridge: Cambridge University Press.
- Calder, I., J. Amezaga, B. Aylward, J. Bosch, L. Fuller, K. Gallop, A. Gosain, R. Hope, G. Jewitt, M. Miranda, I. Porras and V. Wilson. 2004. Forest and Water Policies. The Need to Reconcile Public and Science Perceptions. *Geologica Acta*, 2: 157-166.
- Aylward, B. 2003. Covering the Cost. In *Flow: The Essentials of Environmental Flows*, edited by M. Dyson, G. Bergkamp and J. Scanlon. Gland: IUCN.
- Aylward, B. 2003. The Actual and Potential Contribution of Nature Tourism in Zululand: Considerations for Development, Equity and Conservation. In *Nature Tourism, Conservation and Development in KwaZulu Natal, South Africa*. Edited by B. Aylward and E. Lutz. Washington, DC: World Bank.
- Porter, S., S. Ferrer and B. Aylward. 2003. The Profitability of Nature Tourism in Zululand: A Survey of Private Reserves and Public Protected Areas. In *Nature Tourism, Conservation and Development in KwaZulu Natal, South Africa*. Edited by B. Aylward and E. Lutz. Washington, DC: World Bank.
- Aylward, B. 2003. Creating a Nature Tourism Economy: A Multicriteria Analysis of Options for Policy, Institutions, and Management. In *Nature Tourism, Conservation and Development in KwaZulu Natal, South Africa*. Edited by B. Aylward and E. Lutz. Washington, DC: World Bank.
- Aylward, B., and E. Lutz. (eds). 2003. *Nature Tourism, Conservation and Development in KwaZulu Natal, South Africa*. Washington, DC: World Bank.
- Rojas, M., and B. Aylward. 2002. Mechanisms for Upstream-Downstream Cooperation in Rural Watersheds: The Case of a La Esperanza: A Small, Private, Hydropower Producer in Costa Rica. In Kiersch, B. (ed) *Watershed-Based Integrated Land and Water Management: Valuation of Land Use Impacts on Water Resources and Mechanisms for Upstream-Downstream Cooperation in Rural Watersheds*. Rome: FAO.
- Aylward, B., and S. Tognetti. 2001. Valuation of Hydrological Externalities of Land Use Change: Lake Arenal Case Study. In Kiersch, B. (ed) *Watershed-Based Integrated Land and Water Management: Valuation of Land Use Impacts on Water Resources and Mechanisms for Upstream-Downstream Cooperation in Rural Watersheds*. Rome: FAO.
- Aylward, B., and J. Echeverría. 2001. Synergies between Livestock Production and Hydrological Function in Arenal, Costa Rica. *Environment and Development Economics* 6(3): 359-382.
- Fernandez-Gonzalez, A., and B. Aylward. 1999. Participation, Pluralism and Polycentrism: Reflections on Watershed Management in Costa Rica. *Unasylva* 50 (4): 52-59.
- Aylward, B., R. Mejías and K. Allen. 1999. Análisis Financiero y Económico de la Ganadería en la Cuenca del Río Chiquito, Arenal, Costa Rica. *Agronomía Costarricense* 23(2): 125-136.
- Lindberg, K., and B. Aylward. 1999. Price Responsiveness in the Developing Country Nature Tourism Context: Review and Costa Rican Case Study. *Journal of Leisure Research* 31(3): 281-299.
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- Aylward, B., K. Allen, J. Echeverría and J. Tosi. 1996. Sustainable Ecotourism in Costa Rica: the Monteverde Cloud Forest Preserve. *Biodiversity and Conservation* 5: 315-343.
- Aylward, B. 1996. Capturing the Pharmaceutical Value of Species Information: Opportunities for Developing Countries. In Balick, M. and Laird, S. (eds.) *Green Gold: The Wealth of Medicines in the World's Tropical Forests*. New York: Columbia University Press. 219-229.
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- Barbier, E.B., J.C. Burgess, J. Bishop and B. Aylward. 1994. *The Economics of the Tropical Timber Trade*. London: Earthscan.
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- Aylward, B. 1992. Appropriating the Value of Wildlife and Wildlands. In E.B. Barbier and T. Swanson (eds.) *Economics for the Wilds*. London: Earthscan. 34-64.
- Aylward, B., and E.B. Barbier. 1992. Valuing Environmental Functions in Developing Countries. *Biodiversity and Conservation* 1(1): 34-50.
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- Aylward, B. 1991. Evaluación Económica de las Funciones Ambientales en los Países en Desarrollo. In *Taller Internacional de Ecología y Economía*. Turrialba, Costa Rica: Centro Agronómico Tropical de Investigación y Enseñanza (CATIE).

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- Aylward, B. 2009. *The Role of Voluntary and Market-Based Initiatives in Freshwater Ecosystem Restoration*. White Paper. Portland: Bonneville Environmental Foundation
- Garrick, D., R. Wigington, B. Aylward and G. Hubert (eds.). 2009. *The Nuts & Bolts of Flow Reallocation*. Proceedings of a workshop held February 22nd, 2009 in Port Elizabeth as part of the International Conference on Implementing Environmental Water Allocations. Boulder, CO: The Nature Conservancy
- Aylward, B. 2008. *Oregon's Conserved Water Statute: Returning Conservation Savings to Oregon Rivers*. Bend: Ecosystem Economics.
- Aylward, B. et al. 2008. *Policy Cornerstones and Action Strategies for an Integrated Ecosystem Marketplace in Oregon*. Prepared for the Willamette Partnership and Defenders of Wildlife. Corvallis, Institute for Natural Resources, Oregon State University.
- Asquith, N., and S. Wunder with B. Aylward et al. 2008. *Payments for Watershed Services: The Bellagio Conversations*. Santa Cruz de la Sierra: Fundación Natura.
- Garrick, D., B. Aylward, M. Siebentritt and A. Purkey. 2008. *Proceedings of a Workshop on Environmental Water Transactions: Lessons Learned and Future Prospects*. Washington, DC: National Fish and Wildlife Foundation.
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- Hartwell, R., and B. Aylward. 2007. *The Use of Auction Mechanisms to Allocate Water Rights in Central Oregon*. River Papers No. 1. Bend, OR: Deschutes River Conservancy.
- Aylward, B. 2006. *The Central Oregon Water Bank*. Deschutes River Conservancy Technical Report. Bend, OR: Deschutes River Conservancy.
- Aylward, B. 2006. *Growth, Land Use and Irrigated Agriculture in Central Oregon*. Deschutes Water Alliance Issues Paper. Bend, OR: Deschutes River Conservancy.
- Golden, B., and B. Aylward. 2006. *Measurement, Monitoring and Instream Flow in the upper Deschutes River Basin*. Deschutes Water Alliance Issues Paper. Bend, OR: Deschutes River Conservancy.

- Fitzpatrick, K., B. Aylward, B. Golden and K. Gorman. 2006. *Reservoir Management for Instream Flow and Agriculture in the upper Deschutes River Basin*. Deschutes Water Alliance Issues Paper. Bend, OR: Deschutes River Conservancy.
- Rojas, M., and B. Aylward. 2003. *What are We Learning from Markets for Environmental Services? A Review and Critique of the Literature*. Environmental Economics Programme. London: IIED.
- Aylward, B., et al. 2001. *Financial, Economic and Distributional Analysis of Large Dams*. WCD Thematic Review III.1. Cape Town: World Commission on Dams.
- Aylward, B., J. Echeverría, K. Allen, R. Mejía and I.T. Porras. 1999. *Market and Policy Incentives for Livestock Production and Watershed Protection in Arenal, Costa Rica*. CREED Working Paper Series No. 25. London: IIED.
- Aylward, B., and A. Fernández González. 1998. *Incentives and Institutional Arrangements for Watershed Management in Arenal, Costa Rica*. CREED Working Paper Series No. 21. London: IIED.
- Aylward, B., and I.T. Porras. 1998. *An Analysis of Private and Social Discount Rates in Costa Rica*. CREED Working Paper Series No. 20. London: IIED.
- Aylward, B., and I.T. Porras. 1998. *Tasas de Descuento en Costa Rica: Análisis Privado y Social en Costa Rica*. CREED Costa Rica Notas Técnicas No. 11. San José: CCT/CINTERPEDS/IIED.
- Echeverría, J., Aylward, B. and Porras, I.T. 1997. *Externalidades de la Ganadería en la Cuenca del Río Chiquito, Arenal, Costa Rica*. CREED Costa Rica Notas Técnicas No. 10. San José: CCT/CINTERPEDS/IIED.
- Aylward, B., K. Allen and R. Mejías. 1997. *Análisis Financiero y Económico de la Ganadería en la Cuenca del Río Chiquito, Arenal, Costa Rica*. CREED Costa Rica Notas Técnicas No. 9. San José: CCT/CINTERPEDS/IIED.
- Fernández González, A., B. Aylward, C. Carranza y M. Miranda. 1997. *Incentivos Económicos y Arreglos Institucionales para el Manejo de Cuencas Hidrográficas en la Cuenca del Río Chiquito, Arenal, Costa Rica*. CREED Costa Rica Notas Técnicas No. 8. San José: CCT/CINTERPEDS/IIED.
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- Spurgeon, J.P.G., and B. Aylward. 1992. *The Economic Value of Ecosystems: 4 - Coral Reefs*. LEEC Gatekeeper Series 92-03. London: IIED.
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