Ranero, C.R. and R. von Huene, Subduction erosion along the Middle America convergent margin, *Nature, 404*, 748–752, 2001.

Tera, F., L. Brown, J. Morris, I. Selwyn Sacks, J. Klein, and R. Middleton, Sediment incorporation in island-arc magmas: Inferences from ^{10}Be, *Geochim. Cosmochim. Acta, 50*, 535–550, 1986.

Vannucchi, P., D.W. Scholl, M. Meschede, and K. McDougall-Reid, Tectonic erosion and consequent collapse of the Pacific margin of Costa Rica: Combined implications from ODP Leg 170, seismic offshore data and regional geology of the Nicoya Peninsula, *Tectonics, 20*, 649–668, 2001.

Vannucchi, P., C. R. Ranero, S. Galeotti, S. M. Straub, D. W. Scholl, and K. McDougall-Ried, Fast rates of subduction erosion along the Costa Rica Pacific margin: Implications for non-steady rates of crustal recycling at subduction zones, *J. Geophys. Res.*, in press.

von Huene, R., and J. Aubouin, Summary-Leg 67, Middle America Trench transect off Guatemala, *Initial Rep. Deep Sea Drill. Proj., 67*, U.S. Government Printing Office, Washington, D.C., 1982.

von Huene, R., C. R. Ranero, W. Weinrebe, and K. Hinz, Quaternary convergent margin tectonics of Costa Rica, segmentation of the Cocos pate, and Central American Volcanism, *Tectonics, 19*, 314–334, 2000.

—ROLAND VON HUENE, University of California at Davis (on behalf of the co-proponents of CRISP)

THE BOOKSHELF

A Peculiar River: Geology, Geomorphology, and Hydrology of the Deschutes River, Oregon

PAGE 304

Eos: Why write a book about this particular river?

Grant: We really didn't know how unusual the Deschutes was when we set out to study it. Its peculiarities emerged in the course of our investigations, which were initially directed at understanding how several large hydropower dams that were being relicensed might have affected the structure of the downstream channel. From studies on other rivers, we expected that we would find clear signals of physical changes to channel morphology, such as channel incision or a textural coarsening of the riverbed, which we could attribute to the dams. But what we found during the course of our studies was that the Deschutes was not like other rivers and that the classic, expected responses were not in evidence. We learned that our own preconceptions of how rivers work—how they respond to disturbances such as dams—needed rethinking.

So we became interested in what made this river different from others that had been studied in the past. We realized that the Deschutes' unusual geological setting resulted in a distinctive history that influenced its current state and, the more we explored along those lines, the more we realized that the ways in which we commonly interpreted how dams and land use affect rivers is often put forward without regard to its particular geological environment. In the case of the Deschutes, we found that past geological phenomena, such as catastrophic dam-break floods and volcanic events, shaped how the river responds to more modern disturbances. It's that interplay between the ancient and the modern that jumped out at us.

Eos: Because of the unusual circumstances surrounding the Deschutes, are the findings from this book applicable to other rivers and river basins?

O'Connor: All rivers are peculiar in their own way, but some are more peculiar than others. That being said, much of the hydrology of the Deschutes is relevant to other rivers, particularly those in volcanic landscapes. And even though the Deschutes is probably the most stable river of its size in the country, the findings from our studies could be applied to other rivers with relatively constant flows. Moreover, we believe that understanding rivers that don't respond to dams helps us understand responses in rivers that do.

But more generally, we think that the integrated approach we adopted and developed in this book provides a framework for understanding other rivers in diverse settings. What emerges from such holistic studies is that you can't view the modern flow regime, flood history, channel morphology, and stream biology as independent from each other or from the broader geological context of the watershed. We learned that the river processes we discovered in one part of our studies could have a significant impact on other parts of the river. For example, the hydrology in the Deschutes has a tremendous effect on the fish distributions in the basin, as does the location of ancient flood deposits. If such a holistic approach were applied to other rivers, I believe that you would find these same types of interdisciplinary land-water and ancient-modern connections as we found in the Deschutes. Although the book is a set of individual chapters looking at different facets of the river, we've tried to use the introductory and transition material to weave a coherent narrative of how the river functions.

Eos: What does this book tell us about a river's response to dams?

Grant: We think that the book represents a model of at least some of the types of analyses that should precede dam construction, relicensing or removal. Dams represent large-scale interventions or manipulations of rivers, and the lessons we've learned from these studies have taught us that you can't approach dam issues from a single angle. Not all dams are created equally, nor do they have equal impacts on river basins. What the Deschutes has really helped us see is that one has to go beyond the flow regime and other general information typically considered the usual suspects, and consider the full geologic, geographic, and historical context in which dams are embedded. Those factors have as much as anything to do with how a river system should be operated.

It's also worth mentioning that the book isn't only about dams; most of it focuses on the processes and dynamics that shape a modern river. The underlying reasons why the dams on the Deschutes have had so few effects on the river's hydrologic system are largely because of its stable water flow and the extremely low sediment yields in the river basin. The dams don't capture much sediment and the river almost never floods, so the river rarely has any adjustments that could affect its boundaries or other downstream conditions.

Eos: Who do you anticipate will make the best use of the information in the book, and what kind of information will they find most valuable?

O'Connor: It's obviously targeted to people who are interested in rivers. But it's also going to interest people who are curious about the interaction between landscapes and rivers. We'd like to think that this book is a little different than other case studies about individual rivers because while it does tell you a quite a bit about the Deschutes, it also gives you a sufficiently deep look into the web of processes and historical interactions that define how rivers work. That's what we think makes it interesting to a broader audience. The Deschutes is a fascinating river and we hope this book will not only help people appreciate this particular river more, but also appreciate their neighborhood river as well. Also, we felt strongly that while the individual papers in this book could probably stand alone in scientific journals, we wanted to present them together to emphasize the linkages among the papers. It's much more evident that they build on each other when you see them all together.

Grant: Understanding unusual rivers helps us better understand more normal rivers. Even though it's not one of those rivers on the tip of everyone's tongue, the Deschutes fits within a broader context of how we understand other rivers. For example, if I were describing the Deschutes to someone, I would put it outside the spectrum of normal alluvial rivers that textbooks are written about, the kind that flood every couple of years, moving most of their bedload and shaping their channels during those floods, and respond to a reduction in sediment supply by narrowing their beds or eroding their banks. Further out on the

spectrum are mountain streams, which have what I describe as decades of boredom followed by hours of chaos during extreme floods. In the case of the Deschutes, however, you literally have centuries or millennia of boredom punctuated by absolutely spectacular events. Understanding the Deschutes helps us place rivers that fit the expected models and simulations within the full range of potential river behavior and response.

Water Science and Application Series, Vol. 7; 220 pp.; hardbound; ISBN: 0-87590-356-8; AGU member price: $44; non-member price: $63.

—JONATHAN LIFLAND, AGU Science Writer