

# Publications

5 **Easy Pieces: The Impact of Fisheries on Marine Ecosystems** by Daniel Pauly (2010), 236 pp., Island Press, Washington, DC, USA. ISBN 9781597267199 (pbk), GBP 15.99/USD 25.00

Up until the 1990s global fish stocks appeared to be growing but, in fact, global fisheries landings were declining by c. 500,000 t per year from a peak of 80–85 million t in the late 1980s. How did this critical misunderstanding occur? Daniel Pauly aims to explain this and other misconceptions relating to fisheries science and management to show, as he describes it, 'the transition from the first, initially contested realization that the crisis of the fisheries and their underlying ocean ecosystems was global in nature, to its broad acceptance by mainstream scientific and public opinion'. He does this using five of his own articles originally published in *Science* and *Nature* between 1995 and 2003, each followed by the immediate responses to his findings from scientific colleagues and the media.

The chapter arrangement can feel as if it is rather labouring the point but this is because he wants to demonstrate two things: firstly, the intensity of opposition to his original findings and, secondly, his realization that by interacting with the popular media scientists are less likely to lose control of how a story is described and better able to shape the reception of their results. This led Pauly, who was initially wary of journalists, to start to work closely with them as part of the Sea Around Us project, which analyses the impacts of fisheries on the marine ecosystem.

He suggests that this book is for environmental activists (to inform advocacy), marine biology/fisheries graduates (to understand the core of their subject), and undergraduates who would benefit from understanding how science is debated. Although he hopes to provide an unbiased view, that is not possible and the outcome is a textbook with a worthy agenda and a very passionate tone. None of the pieces are simple and each is backed by years of number crunching.

Firstly, he demonstrates the importance of fisheries management, taking account of the impact of fishing on the whole ecosystem rather than just individual species. He worked out that humans were using much more of the primary productivity of the ocean than the 2% previously thought. In

fact, 8% of primary productivity was required to sustain global fisheries (when discard is accounted for, which in the 1990s was 27 million t of a global catch of 100 million t). This equated to only 2% of open oceans but 24–35% at the continental shelf, an area crucial to fish production.

Secondly, he explains that globally fisheries are fishing down the food web, a concept for which he is well known (although new research indicates that in certain areas, such as the Gulf of Thailand, fisheries may actually be fishing up the web). Fishing down the food web can occur as fisheries pinpoint a lower trophic level species (such as prawns) or can occur because of the target species being overfished (such as cod). Fishing down the food web simplifies it, making it more difficult for predators to switch between prey species. This means that if fishery quotas are set wrongly, species not only become overexploited but, eventually, extinct.

Thirdly, he explains why Chinese fish stock reporting was, until recently, flawed, and the impact this had on global fishery statistics. Pauly and colleagues discovered that promotions for Chinese officials were wholly dependent on reporting increasing fish stocks in their sector. The impact of this was that global fisheries statistics had been greatly inflated for many years, and instead of increasing, global fish stocks had actually been decreasing by 0.7 million t per year since the late 1970s.

His fourth point is that humans have never managed their natural marine resources sustainably. For example, during the 1950s and 1960s increase in fishing effort led to huge increases in catches. The first collapse was of Peruvian anchoveta in 1971–1972. This was attributed to an El Niño event and so fishing continued unabated. The declining trend was next seen in the North Atlantic with cod, with the New England and eastern Canada stocks collapsing in the early 1990s.

These all build up a worrying picture. So what can we do about it? Pauly suggests that predictions of the future of fisheries are best undertaken using a series of scenarios to demonstrate possible outcomes from different management options. He uses the four scenarios developed by the Millennium Ecosystem Assessment to describe what may happen to fishing fleet structures and biodiversity. The scenarios that appear to provide the best outcome for biodiversity require positive policy change as well as a complete change of philosophy towards adherence to sustainability, both far from current practice.

He makes a number of pertinent reflections on management, noting that fisheries are part of a global enterprise that is undermining its supporting ecosystems rather than being species-specific and benefiting local fishers. Aquaculture is not a panacea, with current practices further threatening wild fish because they are fed to farmed fish. Perverse incentives and subsidies continue to ensure fisheries can continue to operate after they have depleted their resource base. Industrial fisheries and agriculture depend on cheap subsidised fossil fuels; if prices rose energy intensive industrial fisheries would fold. Decommissioning of vessels can allow fleets to modernize. Fleet reduction must occur, with those still fishing paying a rent to those that have stopped.

Pauly recommends that reducing fishing effort, taking a precautionary approach to fisheries policy and developing marine protected areas that conserve a representative set of marine habitats, including no-take fishing zones, are the only methods that will take the pressure off depleted fish stocks. Overall, I found this book hard work but fascinating and it is disappointing that the majority of it is still necessary—that Pauly still needs to bang home the message that we are overexploiting our marine resources. As this is the case, the final section on management felt rather thin and the reader is left wanting more of Pauly's wisdom on the next steps.

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**Ecosystem-Based Fisheries Management: Confronting Tradeoffs** by Jason Link (2010), 224 pp., Cambridge University Press, Cambridge, UK. ISBN 9780521762984 (hbk), GBP 45.00/USD 72.00

Marine fisheries are generally regarded to be in fairly poor shape, with blame placed squarely on the way fish stocks are managed. This so-called fisheries issue, commonly regarded as a global crisis, has been broadcast well outside conservation and fisheries science circles, largely thanks to a recent series of newsworthy publications in high impact journals. Consequently, the way fisheries are managed has fallen under greater academic and public scrutiny than

ever before. The issue has been met with calls for reductions in fleet size and fishing effort, elimination of public subsidy for the fishing industry, increased selectivity and banning of damaging fishing practices. But to many the problem is rooted far deeper: we need nothing short of a revolution in the science underpinning fisheries management and a move towards an ecosystem-based approach to management.

Managing fish stocks in an ecosystem context is not a new concept but it is certainly not in the mainstream. Ecosystem-based fisheries management is generally regarded as too complex, uncertain and data-hungry a process to be feasible. Yet, meeting these challenges head on, this book provides a manifesto that defends this type of management as not only a priority but also as a workable solution.

Throughout much of this well written and energetic book, Link assumes a casual style that those acclimatized to fisheries literature may not be used to but all can appreciate. This doesn't reduce the legitimacy of the science, which in places is thick, and will no doubt boost readership. But although this book will primarily appeal to fisheries scientists and postgraduates it is not a reference manual, and is written to be read from cover to cover.

The book is in three sections, the first of which defines ecosystem-based fisheries management and provides an historical, theoretical and contextual background. These initial chapters are generally positive and, in places, refreshingly optimistic about where we are and where we need to be in terms of managing fisheries responsibly. Only in the third chapter, which examines the religious philosophies underlying stewardship, does Link perhaps overstate his personal views on why this type of management is justified. The pragmatic question asked by the final chapter of the section is particularly useful: when does it make sense to do ecosystem-based fisheries management? This question will be asked by many, and Link answers using a medley of case study examples.

The second section provides a synopsis of the science required to make ecosystem-based fisheries management operational, and introduces the analytical basis from which to monitor, evaluate and generate management advice for an ecosystem. These middle chapters are illustrative, and mildly prescriptive, of how the wide array of approaches to implement ecosystem-based fisheries management can be, and have been, brought together. This section gave me a real sense of the many practical but potentially treacherous simplifications made in fisheries science. No fish stock exists within an ecological

vacuum and ignoring this can be dangerous. Encouragingly, Link demonstrates that the methodology to do ecosystem-based fisheries management is already available, even in data-poor situations, and all that is required is the institutional will.

The final section picks up on this idea and looks at institutional considerations. Throughout the book up until this point I had been mulling over how emerging ecosystem-based fisheries management models, methods and techniques would be received by those tasked to do it. Unfortunately this last section—the shortest by several chapters—doesn't provide an outright answer. I concede that this question isn't likely ever to receive a straight answer but to me at least it remains an important consideration in the success of implementing ecosystem-based fisheries management.

The bottom line, which I think resounds clearly throughout, is that ecosystem-based fisheries management is a concept that we would be reckless to ignore. Fisheries science guides the commercial exploitation of countless marine ecosystems, yet in many cases it does this blindly. A move to this type of management will no doubt be a challenge but is also a necessity if we are to manage our marine resources responsibly. But, encouragingly, as Link shows, we already have the means to do this.

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### **Safe Passages: Highways, Wildlife, and Habitat Connectivity** edited by Jon P. Beckmann, Anthony P. Cleverger, Marcel P. Huijser & Jodi A. Hilty (2010), xix + 396 pp., Island Press, Washington, DC, USA.

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9781597266536 (hbk), USD 70.00

Several tropical, biodiversity-rich nations are going through rapid economic growth, bringing welcome benefits including infrastructure development. One of the key sectors of such growth is the building of roads and road expansion projects. However, these benefits carry environmental costs, including habitat fragmentation, which have a lasting impact on wildlife communities and especially wide-ranging, threatened species. The subject of roads, particularly highways, as a conservation threat has recently drawn much attention. However, although road ecology is well developed in Europe and North America, it is still in a nascent phase in the tropics.

Divided into 17 chapters, *Safe Passages* involves 34 authors, some highly reputed in their fields, including road ecologists, conservation scientists, civil engineers, GIS specialists and transportation planners. Divided into four main parts, the first section broadly outlays the problems of roads for wildlife including fragmentation effects, mortality, influence on landscapes and other negative consequences. This section of the book also describes various mitigation and crossing structures.

Part two analyses the policy issues related to project planning, reviews processes of road formation and gives insights into how conservation practitioners could involve themselves in planning and in engaging with transportation planners. However, some of the processes suggested may be less relevant to tropical countries, where systematic planning is largely non-existent and agreed commitments by agencies may not always be honoured because of diverse goals, sometimes political. This is largely true for highway projects as they are ridden with corruption in many developing nations. However any project that affects wildlife needs to collaborate and develop mitigation strategies early in the planning and review process or else it will end up in needless controversies, delays in project delivery timelines, and in most cases cause irreversible damage to wildlife habitats.

The next part of the book is an interesting section, with some success stories presented. A series of case studies, including The Trans-Canada Highway, and US Highways 93, 64, I-40 and I-75 (Alligator Alley), of successful implementation of ecologically sound solutions that helped the Florida panther, mule deer, black bear, cougar, elk, red wolf and a range of other species are discussed. This part describes the key players, critical factors and effective partnerships, along with scientific knowledge, required to achieve conservation goals. Having worked to mitigate the impacts of three highways in two southern Indian tiger reserves, I understand the significance of building partnerships, especially within the Government.

The final section of the book looks at recent innovative developments and technological solutions in road ecology (although these may not be viable solutions for developing nations). It also illustrates citizen science projects and collaborative approaches with volunteers and decision makers to promote wildlife conservation.

In places the book becomes somewhat monotonous as there are too many similar examples, repeated descriptions of threats caused by highways, and a lack of a diversity of solutions (or perhaps there aren't many).