

**Win-Win Ecology:  
How the Earth's Species  
Can Survive in the Midst  
of Human Enterprise**

*MICHAEL L. ROSENZWEIG*

**OXFORD UNIVERSITY PRESS**

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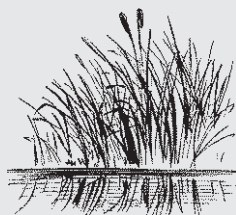
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Dedicated to *Gordon Orians*  
the very model of a compleat ecologist



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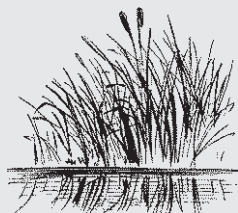
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## Preamble



There is still time. There is good reason to believe that civilization need not destroy most of the Earth's nonhuman species. The trick is to learn how to share our spaces with other species. If we do so, we won't find ourselves bereft of our plant and animal cousins and hoping for a visit from extraterrestrials to keep us company.

*Sharing our habitats deliberately with other species.* I call this "reconciliation ecology." The evidence cries out for us to do a lot more of it, and that doing a lot more of it can save most of the world's species. This book will explore that evidence.

The book will also describe many examples of reconciliation ecology, stories of people who have designed habitats for themselves or for their enterprises, and then find out that wild things also use these habitats successfully. Sometimes the sharing is accidental, sometimes quite purposeful. But sharing works. And it is very cheap.

Despite its title, the book may displease some of those who are devoted to "green" causes. They may not trust my claim that we need to end the battle between ecology and economics. But this is a book of science, not theology and not politics. And the claim comes straight from the ecological science of diversity. The science is very clear, and those who care about wild species can do them no better favor than to be guided by it.

Nevertheless, this book is not a signal for environmentalists to surrender their cause to those human beings whose job it is to exploit the Earth. I want our developers, fishers, farmers, ranchers, and tree growers to realize that I am not only calling for environmental peace and cooperation, but also for a radical change in the way they treat the land and waters of this planet. I am not asking them to stop earning a living or making a profit. People and their enterprises will not be denied, and *need* not be denied. But we can avoid a mass extinction of Earth's species without ourselves committing mass suicide.

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WIN-WIN ECOLOGY

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## CHAPTER 1

# *Reconciliation Ecology*

The wolf shall dwell with the lamb,  
The leopard lie down with the kid<sup>1</sup>

Today's dominant strategy of conservation biology is reservation ecology: save the Earth's natural habitats. However, in many environments, we have already saved about as much natural habitat as we can. A secondary conservation strategy, restoration ecology, supplements reservation ecology. Restoration ecology tries to return some developed places to a more natural status. But the truth is that even less land remains available for restoration than for reservation. The shortage of land turns out to be a critical problem. Because of it, most species, even those apparently now succeeding in our reserves, will eventually vanish. So we cannot rely on the current balance of conservation efforts. Conservation biology must develop a new strategy if it is going to extend and preserve its successes.

This strategy already exists. I call it *reconciliation ecology*. Reconciliation ecology seeks environmentally sound ways for us to continue to use the land for our own benefit. It follows the words of the Chinese sage who long ago said, "The careful foot can walk anywhere."

Certainly we must not abandon reservation or restoration ecology. We must continue to protect what we have saved. But increasingly, we should turn to reconciliation ecology because avoiding the impending mass extinction will require employing it extensively.

In addition to its primary value as a conservation tool, reconciliation ecology offers a valuable social by-product: It promises to reduce the endless bickering and legal wrangling that characterize environmental issues today. We are all human beings. We share a stake in the world we are building. No one wants it to be sterile and lonely. And no one wants us to destroy our technology and reduce our future to the harsh, subsistence-level lives led by our Stone-Age forbears. Reconciliation ecology gives us a conservation strategy that recognizes these simple truths and unites us in our common goals.

The following example of reconciliation ecology in miniature will help give you an idea of what it means.

### *The Red Sea Star Restaurant*

The city of Eilat, Israel, sits at the tip of the northeastern arm of the Red Sea. Eilat and its neighbor, Aqaba, Jordan, form the extreme western end of a great and glorious biogeographical assemblage, the Indo-Pacific coral reef biome. Its variety of species, its splendor of hues and shapes beggars the imagination. If you have snorkeled or scuba dived there, you know what I mean. If you have snorkeled or scuba dived only in the Caribbean, multiply what you saw there by ten.

As recently as 1960, both Eilat and Aqaba were little more than small village outposts. The coral reef flourished in the clear tropical waters along their waterfronts. But things soon deteriorated. Israel decided to develop Eilat as a deep water port because it still lacked access to the Suez Canal. Construction of port facilities tore into the reef and shipping polluted the waters.

Today, because Israel now has access to the Suez, the ship traffic has dwindled. But a giant tourism industry has taken shipping's place as a threat to the reef. So, Israel has set aside a small fraction of its part of the reef as a national park: Eilat Coral Reef Nature Reserve.

To get to most coral reefs, one has to boat or swim across a lagoon. But the reef of this park lies right at the water's edge, easily accessible to everyone. A luxurious resort hotel stands at one end of the park and from the city center, a municipal bus route will take you cheaply and conveniently to the entrance gate. From there, it is only a 30-second walk to the reef—if you go slowly. Hordes of people come to sun themselves on its beach and swim among its wonders.

The Israel Nature Reserves Authority has met the challenge of such potentially destructive tourism. It carefully supervises tourists at Eilat Coral Reef Nature Reserve and prohibits them from trampling about on the reef—especially in the shallows where the young of so many species grow sheltered from some of their most dangerous predators. I do wish it could also prohibit the loudspeakers of the glass-bottom tourist boats that ply the waters only a few meters from the swimmers, and the blaring of the hotel’s musical entertainment system, piped to the beach as an imagined courtesy to its guests. But these detract only from my aesthetic pleasure and only when my head is not underwater. They seem not to diminish the success of the wildlife at all. Eilat Coral Reef Nature Reserve is a joy.

Nevertheless, most of the reef that once lay in Israeli waters is gone, sacrificed to industry and tourism and inadequate sewage treatment. Imagine my surprise then when the travel section of our local newspaper told about the new Red Sea Star Restaurant in Eilat. It would soon open, underwater and surrounded by coral reef! What could those Israelis be thinking of? The only reef left was in the reserve. Were they giving it up?

I should have known better. On a research trip to Israel, my wife, Carole, and I decided to have lunch at this improbable place. We went back and forth along the north end of the reserve looking for a sign. Nothing. Then we found its ad in a local tourist magazine. The article in Tucson’s morning newspaper had not been fantasy after all.

So, the Red Sea Star Restaurant existed, but we still could not find it. The road along the shoreline was an unrelenting jumble of undistinguished, fairly ugly business architecture. We asked for help and were directed to the worst of it, the corner of the waterfront where center-city commerce turns sharply into a great municipal scar of tourist hotels and shops. Incredulous, we made our way across a short, narrow footbridge to a platform a few meters from shore. On it, barely above sea level, stood a rather small, nondescript structure. We entered.

“Yes, this is the place,” we were told. “Just take the elevator down two floors.”

**Down two floors?** I knew how Alice must have felt.

What we saw when the elevator opened made us tingle with awe and disbelief. It could not have impressed us more to have been beamed aboard the bridge of the Starship Enterprise. Half the floor was a cocktail bar, and



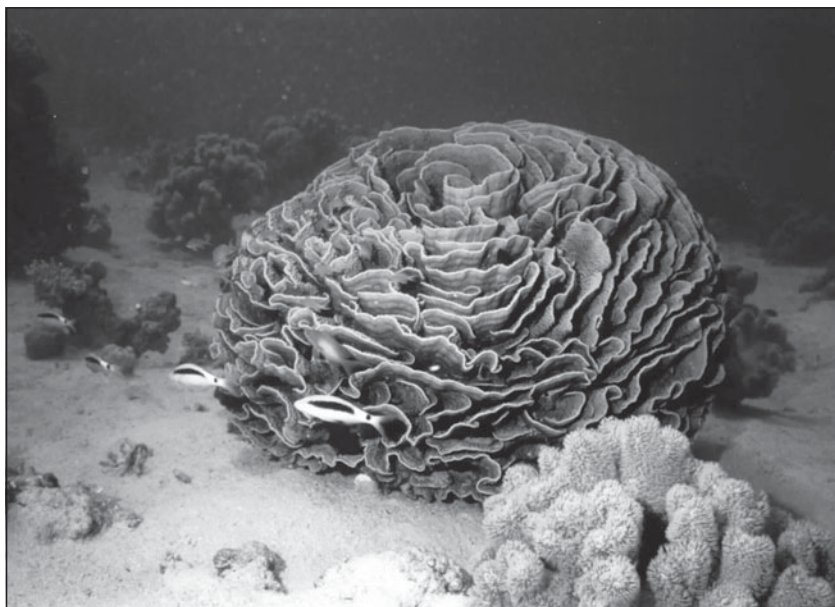


The Red Sea Star Restaurant: view of the interior. Courtesy The Red Sea Star Ltd. –Eilat (972-8-6347777).

half, an elegant, white-tablecloth restaurant. Natural light streamed in from the sea—through portholes in the ceiling and fancifully shaped windows that lined the entire structure. Outside those windows was a coral reef full of the gorgeous fish and other lovely animal species that inhabit the reserve several miles away. We had entered an underwater terrarium. We were on exhibit for the fish!

Lunch was delicious. But, as fine as the cuisine was, it could not begin to compete with the space in which we dined. I actually saw a few species that I had never seen in the reserve—despite many visits over the years. In fact, I was so dazzled that I did not even ask the obvious question: Where had this section of reef come from? It had been destroyed decades before. What miracle had resurrected it?

Carole approached the problem with less emotion. She noticed a metal mesh that underlay the coral growth. Was the whole thing bogus? Were branches and bits of coral strung up on a matrix and replaced as they died? Were the fish lured in with supplements of food? Was the enterprise just like the potted houseplants in great tubs scattered about the semi-



Coral reef as seen through a window of the Red Sea Star Restaurant. Courtesy The Red Sea Star Ltd. – Eilat (972-8-6347777).

darkness of a boomer restaurant and rotated out to drink the light on the day before they would have etiolated and sickened? We had to find out.

Reuven Yosef is a pioneer of reconciliation ecology. He lives in Eilat and we were going to see him that evening. He told us the whole story.

Eilat has a fine commercial aquarium and underwater observatory called Coral World. It exists for tourists who cannot snorkel or scuba. Researchers at Coral World had been working to solve an important problem of any aquarium that wants to keep coral alive in tanks of sea water: All species of coral are colonies of animals, and any broken piece of coral soon becomes infected and dies. But the researchers had learned how to treat the coral with antibiotics. After several months of such treatment, a coral fragment would heal completely and could be safely relocated.

Yosef took me to visit the coral hospital behind the scenes of Coral World. There, technicians were treating about forty species of all sorts of coral—branching corals, brain corals, fan corals. Step-like supports, resembling a miniature version of the seats at a sports stadium, sat in large tanks of fresh sea water. On them rested rows of coral fragments,



A ward in the coral hospital at Eilat.  
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each carefully labeled with its date of “admission.” Luckily, one treatment fits all sufferers.

Of course, it is illegal to break off coral fragments from the reserve. Yet, accidents do happen. When they do, the fragments are carefully collected and brought to the hospital. Some, after recuperation, go to the Red Sea Star Restaurant. There, divers wire them to a meshwork of iron cloth where they start to grow, soon covering and enveloping their artificial iron matrix. The fish simply volunteer. As they say, if you build it, they will come.

Presto, reconciliation ecology. A restaurant, designed and built to sit in a novel habitat put together by human beings. Today, its corals come from the casualties of a nearby reserve. Tomorrow, pieces of its coral may serve to repopulate the reserve in the event of some unforeseen catastrophe.

When I first began to notice such conservation efforts, they seemed curious, even odd. Didn’t their designers realize that conservation has a duty to focus on pristine environments—or at least on those we are trying to return to some semblance of natural status? But, as you will see, I began to encounter more and more examples like the Red Sea Star Restaurant. Most of these operated on a much larger scale, too. Eventually, I began to appreciate that without reconciliation ecology most diversity is doomed.

The term reconciliation ecology captures the essence of a new outlook for conservationists. Of course, its primary job is to change the way people think about conservation. It does this job by declaring the need to reconcile human uses of our planet with those of other species. But “reconciliation,” the word, also accomplishes two other things.

First, it displays its heritage with pride. Reconciliation sounds very much like it belongs in the family of its predecessors, reservation and restoration. In fact, it does. It has not come to unseat them but to join them.

Second, reconciliation also embodies a delicious, intentional, and useful ambiguity. It has both a political and a biological meaning. Although it has no intention of replacing either reservation or restoration ecology,

it certainly does mean to replace political discord and enmity with political harmony. Conservation is already difficult enough. Friction will only reduce its efficiency.

But what exactly is reconciliation ecology? **It is the science of inventing, establishing, and maintaining new habitats to conserve species diversity in places where people live, work, or play.** I am not suggesting inventing new habitats in reserves, or in acreage where restoration is going on. I am saying that people now use most of the world's land surface, and we can use it better. We can use it in a way that reconciles our needs with those of wild, native species. Reconciliation ecology is the third 'R' of conservation biology.

To practice reconciliation ecology, we must pay close attention our treatment of the land. We must back off a bit, not on the amount of land we take for ourselves, but on how we transform it for our use. Right now, our footprint is too big. Going barefoot is not the answer, but the time has come to trade in our jackboots for the grace and elegance of ballet slippers. The careful foot can walk anywhere.

We can learn how to reconcile our own use of the land with that of many other species. Maybe even most of them. If they have access to our farm fields, our forests, our city parks, schoolyards, military bases, timberlands, yes, even to our backyards, then they have a chance. If they live where we do, then they have what we have. We shall thus be able to minimize their risk of extinction.

But access to our land is not enough. To practice reconciliation ecology successfully, we must learn what species need in order to get along with us, and we must do that job for thousands of separate species. Then, we must diversify the habitats of our surroundings instead of creating, as we now do, the very limited number of habitat architectures that we have come to like. Every front lawn need not look like a golf course. Every city park need not look like a savannah. Every schoolyard need not look like a desert.

The habitats we create around us will be novel, so the species that we hope they save will not be particularly well adapted to them. Those species evolved in an obsolete world, a world that will not return, a world of coast-to-coast wilderness that has been beaten back to the boundaries of our reserves. Yet, although such habitats may be scarce today, the needs of the species that grew up in them—that adapted to them—remain the same. That is why most native species are best adapted to the scarce

habitats of our reserves. To design effective new habitats, we must carefully study the old ones to find out what makes the world of the reserves so suitable. Then we can figure out what is essential and what species can do without. Finally, we can reassemble the critical components into new habitats and landscapes of which we also are a part.

There is a huge difference between what I am advocating and the usual attempt to attract birds to your garden. I am talking about creating self-supporting populations of species on our land. It will take a lot of work. But imagine the result: a vast area of diverse anthropogenic habitats that meet nature halfway instead of trampling her underfoot. Although these habitats would not be ideally suitable for wild things, they would provide enough support to allow them to adapt to us. They would give natural selection the time and space in which to work, and thus could save the overwhelming majority of today's species.

To practice reconciliation ecology we will also need to pool our resources. For a butterfly species, this might mean our banding together in neighborhood groups. No single land parcel may be large enough to contain a self-sustaining population, but 20 might do the trick. Neighbors would join together to select a species and protect it.

For other species, we will need to band together—through our governments—at local or national levels. For migratory species, international cooperation would come into play. I will discuss examples of some of these scales of reconciliation ecology in chapters 2 through 7.

The tasks that we face are all difficult enough, but they pale in comparison to the emotional adjustment we must make. We must give up romantic notions about reserves as wilderness. Yes, we must at last admit the truth: Even in reserves, people can and should be actively involved. That means active management. To make room in our reserves for the species that will need them, we may even have to discourage their use by other species that do not need them, species that we *can* help amid our habitations and our enterprises. It will almost be like admitting that wilderness itself is no more. Yet we must grit our teeth and do it. To do otherwise is to doom most of the very things we want to save.

We could hardly improve on the advice of Dean Acheson:

It seems to me the path of hope is toward the concrete, the manageable. . . . But it is a long and tough job, and one for which we as a people are not particularly suited. We believe that any problem can be solved with a little ingenuity and without inconvenience to the folks at large. . . .

And our name for problems is significant. We call them headaches. You take a powder and they are gone. These pains . . . are not like that. They will stay with us until death. We have got to understand that all our lives . . . the uncertainty, the need for alertness, for effort, for discipline will be upon us.

This is new to us. It will be hard.<sup>2</sup>

Nevertheless it can work, whereas today's dominant conservation strategies cannot. They divide the land into shares, so much for nature and so much for people. This inevitably leads to conflict. And since people are doing the dividing, you can be pretty sure which side will win. We reveal our intentions by calling the shares for nature, "set-asides"—as if we were merely holding them in reserve until we needed them later.

Diversity's best hope comes from what E. O. Wilson calls "biophilia." We all love nature. No one wishes its demise. We merely want to find a way to have our cake and eat it, too.

Lucky us. We can. Reconciliation ecology makes this possible. That Iowa farm family is not about to give up its acreage to be turned back into tall grass prairie anyway. "No worries," says reconciliation ecology. Georgia-Pacific and Weyerhaeuser corporations are not about to sell their tree farms for the restoration of primary forest, and reconciliation ecology says they need not. Philadelphia is not about to abandon and evacuate itself in favor of eastern white pine, and reconciliation ecology finds ways to make it a "greene countrie towne," as William Penn himself intended when he founded it in 1682. Reconciliation ecology can save species without displacing people or their economic activities. In the process, it can reduce political conflict to a minimum.

Mother Earth, after all, is not really smaller than she was five centuries ago. The Earth abides; the land itself endures. We have just transformed it so much that most species have not yet evolved a use for it.

"Conservation philosophy, science, and practice must be framed against the reality of human-dominated ecosystems, rather than the separation of humanity and nature underlying the modern conservation movement."<sup>3</sup> Today's conservation treats the land as if deriving benefit from it amounts to what mathematicians call a zero-sum game. A zero-sum game is like poker—whatever I win, you lose! If land use were truly a zero-sum game then the only way we could use land for ourselves would be to deny it to other species. But if we can reconcile our use of the land with that of other species, then the land will still be there for both sides.

Reconciliation ecology transforms the zero-sum game of competition into a game that humans and nature alike can win.

Is this too much to accomplish even for almighty man? And what about the costs of discovering how to build reconciled habitats, of actually building them, and of maintaining them in perpetuity? Is it all a mere pipedream? Or was Lewis Mumford right when he advised that, “only the dreamers will turn out to be practical.”<sup>4</sup>

Well, if it is a dream, we are already living it. The Red Sea Star Restaurant is but one example of dozens, perhaps thousands of real cases of reconciliation ecology. In this book, you will read about many others. They vary greatly. Some show profits from reconciliation, and some call for better methods to determine its net cost. Some have come from the practice of old, traditional methods of resource use, some from the most modern concepts of design and technology. And these reconciliation projects have been accomplished in rich, poor, and in-between countries, in all sorts of habitats, and at levels from entire national governments, to large private landowners, to individual homeowners. The truth will make you an optimist even if you continue to be the staunchest, most unwavering pragmatist in the world.