



This photo shows the Animas Valley in southwest New Mexico. This is part of the Gray Ranch, owned by one of approximately twenty landowners who belong to the Malpai Borderlands Group.

Farming with the wild

Daniel Imhoff and Jo Ann Baumgartner

In the world of sustainable agriculture, we hear a lot about the term “biodiversity”. This might refer positively to the protection of soil organisms such as earthworms or mycorrhizal fungi. Or it could refer negatively to the devastating loss of traditional crop diversity and the dwindling numbers of plant and animal varieties and breeds that are maintained and used by humans.

It is less often, however, that we hear people speaking about “wild biodiversity” in dialogues about sustainable agriculture, or about the healthy living spaces or “habitats” needed to support native flora and fauna in the areas where agriculture takes place. In some ways this is understandable. After all, agriculture at its very root involves the domestication of the wild. Agricultural operations commonly reduce complex landscapes into zones of intensive production for just a handful of crops, or more often, a single monoculture.

What has become particularly apparent in North America, however, is modern agriculture’s role in the “biodiversity crisis”. Over the past two centuries, agriculture production has converted more and more native areas to agricultural lands – from river valleys to grasslands, to wetlands, uplands and woodlands. In order to compete in global markets, to pay for expensive machinery and inputs, or simply to create “clean” farms without “weeds”, more and more natural vegetation has been erased from farmlands. With the clearing of natural vegetation comes the loss of plant and animal species. The result is that wild biodiversity has been pushed further and further into isolated pockets in the landscape. Agriculture has become the leading cause of species endangerment on the North American continent – and the situation is not that different in other regions throughout the world.

Consider agriculture’s unquenchable thirst for water. More than two-thirds of the world’s available fresh water supplies are now

diverted for irrigated agriculture. Around the world those irrigation systems remain remarkably inefficient, wasting precious water resources. Because of many factors – including dams, agricultural pollution, and the draining of wetlands for agriculture – about one-third of the world’s freshwater fish are now extinct, threatened, or endangered.

Here are some other alarming statistics about industrial agriculture’s impacts on the North American aquatic habitats:

- On average, twenty-five percent of groundwater that is used for agriculture in the United States is not “recharged” or filtered back into the underground reservoir;
- Ninety-eight percent of U.S. rivers have been dammed. This severely impacts the ecological function of river systems, the seasonal flows and abundance, and affects the diversity of species that depend on river habitats;
- Sixty percent of U.S. rivers are polluted by agricultural sedimentation, excessive nutrients and pesticides.

The increasing large-scale production of animals in massive confined animal feeding operations also creates devastating ecological impacts. The concentration of thousands of pigs stacked in cages on top of one another, or dairy cows in operations as large as small cities, generates toxic gasses and groundwater pollution, raises ethical questions and threatens human health. There are other negative impacts as well:

- Converting grasslands to millions of hectares of maize and soybean monocultures to feed confined animals leads to groundwater contamination, loss of topsoil and the widespread decline of many grassland songbird species;
- Excess nitrogen and nutrients flowing into the Mississippi River – mainly from fertilizer runoff and animal manure from feed farms in the Upper Midwest of the USA – contribute to an approximately 13 500 square kilometre “dead zone” of oxygen depletion in the Gulf of Mexico.

Today, roughly two-thirds of public, private, and tribal lands in the USA are used for agriculture, either in grazing, haying or row cropping. This spread of agriculture, primarily to support the grain-fed livestock industry, has had follow-on effects across the whole landscape. Half of the wetlands in the lower 48 states of the USA have been lost in the last century. Each year, some 670 million birds are exposed to pesticides in the United States, and 10 percent die as a result. In order to protect livestock from predators, an estimated 100 000 coyotes, bobcats, bears, wolves, and mountain lions are killed each year by U.S. Department of Agriculture's Wildlife Services. It is not surprising, then, that farming contributes to 42 percent of the endangered species listed in the United States, and ranching to 26 percent. At best, only 9 percent of U.S. lands have been protected as natural areas. The protection of biodiversity therefore depends on the protection, restoration, and expansion of wildlife habitat in existing agricultural lands.

Conservation-based agriculture

The good news is that efforts have been underway for some time to combine agriculture and biodiversity conservation. This movement can be described by a number of terms: *conservation-based agriculture*, *agroecology*, *agroforestry*, *ecoagriculture*, *permaculture*, or *farming with the wild*. In fact, the idea of integrating farming and conservation has deep roots in the North American environmental movement. Defining what he called "biotic farming" in 1939, ecologist Aldo Leopold wrote:

"A good farm must be one where the wild flora and fauna has lost acreage without losing its existence."

In the past decade, a growing number of farmers, ranchers, land trusts, government agencies and consumers are finding that local agricultural operations can not only provide essential sources of nutritious food, but also critical habitat for wild species. Native plant specialists are seeking out remnants of prairies and woodlands and are using local seeds and plants to bring farm edges, riparian areas, and marginally productive fields back to life. In the Sky Islands region of the south-western United States, community organizers, conservationists, ranchers and farmers have been working for over a decade to build the public will and develop strategic plans to connect protected wilderness through corridors that provide "stepping stones" for pollinators, allow lightning-ignited wildfire to travel through selected grasslands, and offer "safe passage" for large carnivores such as jaguars and Mexican wolves. Grass farming is becoming a preferred method of raising dairy and meat cattle in areas with year-round rainfall, an alternative to massive confined animal feeding operations that house tens or even hundreds of thousands of animals on a single "farm". Cropping systems are being tailored toward specific climate characteristics or the needs of threatened species. "Predator friendly" ranchers are learning to coexist with large carnivores by emphasizing careful breed selection, improved fencing, guard animals, and more hands-on management techniques. Following are three case studies:

Audubon California's Yolo County Landowner Stewardship Program

In an industrial agricultural region of California's Central Valley, a county-wide movement is underway to reverse decades of conventional "clean" farming practices. Yolo County's farming with the wild movement began like many initiatives around the country, with the efforts of a few brave individuals. Twenty years ago, unsatisfied with a landscape void of any native habitat along ditch banks, between fields, and along roads, John and Marsha Anderson began bringing the edges of their 200 hectare property

"Hedgerow Farms" back to life. "*A weed-free farmscape doesn't have to mean vegetation free*", explains Anderson.

Anderson studied California's original oak savanna ecosystems to create hedgerows and buffer strips of native grasses, shrubs, and trees between fields. Vegetation was re-established along the irrigation canal that runs through the farm. Seasonal wetlands were restored in low-lying areas. Ponds were built at the bottom of furrow-irrigated fields to filter water and runoff and provide year-round wetland habitats. Eventually, over 50 species of native perennial grasses, forbs, rushes, shrubs, and trees were planted around field borders, roadsides, riverbanks, and other unused strips of the farm. Two decades later, beavers, carnivores, dozens of bird species including three types of owls, and up to ten threatened or endangered species find haven at Hedgerow Farms.

Research scientists from the University of California found that the hedgerows provided a year-round supply of nectar and pollen sources for beneficial insects and pollinators, thereby contributing positively to the farm's output. The Yolo County Resource Conservation District also took notice of the important habitat restoration underway and began developing both expertise and "cost-share" funds to support regional landowners.



Photo: D. Imhoff

This photo shows intensive grazing in a pasture at Enchanted Meadows dairy farm in southeastern Minnesota. By carefully rotating the lightweight, climate-adapted Ayrshire dairy cattle to rested pastures, farmer Art Thicke runs a profitable operation free of antibiotics or hormones (for the animals) and free of herbicides, pesticides, or fertilizers on the pastures. More importantly, Thicke keeps cattle away from important "edge" habitat near the woods until after the late spring nesting season, in an attempt to protect grassland bird species greatly at risk from habitat loss.

Inspired by the efforts at Hedgerow Farms, more of the county's farmers and ranchers initiated restoration projects on their properties. Planting of perennial grasses, prescribed burns for weed and vegetation control, the installation of corridors along waterways, tailwater ponds and stock ponds, as well as the revegetation of irrigation canals and waterways, are becoming standard practices throughout the region. Partnering with landowners, local agencies and other groups, the county now has an ambitious plan to create habitat linkages on both public and

private lands on the boundaries of urban expansion throughout this largely rural area. These efforts will protect riparian areas and link critical upper rangeland habitats, an essential strategy to maximize the protection of native species, such as native pollinators.

Throughout the county, these programmes also use restoration projects as opportunities for field visits and hands-on learning for students with limited access to rural areas. The *Student and Landowner Educational Watershed Stewardship Project*, for example, brings students from regional schools to participate in habitat plantings and monitoring efforts up to 50 days per year.

The Malpai Borderlands Group

Identified as one of the pioneering organizations in the conservation ranching movement, the Malpai Borderlands Group consists of approximately two dozen landowners whose ranches collectively span nearly 400 000 hectares in South Western New Mexico, South Eastern Arizona, and Northern Mexico. The Group was formed in the early 1990s by ranchers concerned about the long-term effects of fire suppression and overgrazing, which had caused critical invasions of brush and woody species into what had formerly been luxuriant grasslands. At a time when anti-grazing activism became politically contentious, the founders of the Malpai Borderlands Group forged an alliance based on the common appreciation for the open space that unfragmented ranch lands provide. Another unifying concern was that their activism should be guided by sound science.

Fires have always been a significant natural process in maintaining the natural grassland ecosystem. Among the first concrete efforts of the Malpai Borderlands Group was the establishment of the *Bootheel Fire Management Plan*. Based on five years of scientific research, as well as consultation with state and federal agencies and private landowners, the plan identified landowners within the region who were willing to allow lightning-ignited and prescribed wildfires to burn on their properties as a means to reduce shrub encroachment and rejuvenate grasslands. A simple, colour-coded “fire map” was compiled including owner names, boundary lines, and contact numbers. The colour coding explained whether fires should be left to burn, put out as soon as possible or if the landowner would like the opportunity to decide. Today, as a result of this initiative, tens of thousands of hectares of grasslands now benefit from the restorative effects of occasional burning.

Another important community initiative developed by the Malpai Borderlands Group is the “grassbank”. With neighbouring ranchers experiencing a number of consecutive years of serious drought conditions, Malpai Borderlands Group co-founder Drum Hadley offered grazing allotments on his extensive Gray Ranch as a regional safety valve. These short-term arrangements permitted neighbouring ranchers to move their cattle to the abundant grasslands of the Gray Ranch, while restoring their own pastures from the ill effects of overgrazing. In return for the grazing privileges, grassbank participants enrolled selected lands in permanent conservation easements – legal agreements to protect against subdivision. With an emphasis on protecting unfragmented habitats, the Malpai Borderlands Group grassbank programme has allowed tens of thousands of grasslands to be reseeded and rejuvenated by fire, and has registered approximately 18 000 hectares in permanent conservation easements. This model has been replicated as a regional conservation tool in various communities, but it needs to be carefully studied with the objective to optimize grassland restoration, rather than simply to maximize grazing in arid regions.

Grass-based pasture systems

In the Blufflands region of southeastern Minnesota, a few kilometres from the Mississippi River, lives a farming family that cares almost as much about resident prairie birds as they do about their modest herd of carefully bred Ayrshire dairy cows. Owners Art and Jean Thicke prefer the Ayrshires because they are hardier, lighter in weight, and longer-lived than conventional Holsteins. By frequently rotating the herd between pastures, they can also maintain critical breeding habitat for many at-risk songbird species, such as meadowlarks, bobolinks, dickcissels, and savanna and vesper sparrows.

The Thickets’ intensive rotational management system is based on maintaining a balance between activity and rest. The approximately 40 hectares of hilly pastures on “Enchanted Acres” have been divided into 42 grazing units, just under a hectare in size. The 90-plus dairy herd is usually moved twice per day. By carefully responding to changing conditions on the land, as well as to the seasonal behaviour of local wildlife, the Thickets have created a stable ecosystem within which to make their living as productive farmers. No chemical fertilizers or herbicides have been applied to the pastures for 25 years, and the land hasn’t been ploughed in 15 years. And while alfalfa, corn, and soybean farms throughout the Midwest lose topsoil to erosion on an annual basis, living pastures such as these keep soil from washing away and help maintain a healthy water cycle. In fact, they have much in common with the prairie ecosystems that previously existed on this region’s fragile soils.

The Thickets have been operating their grass-fed dairy long before “management-intensive” rotational grazing systems became fashionable. Their approach is based largely on intuition rather than prescribed management techniques, and the results are healthy cattle sharing the land with other species in the biological community.

Conclusion

It is becoming increasingly obvious to leading practitioners of sustainable agriculture in the USA that we must view our farms as natural habitats, not just as production units. Experience also shows that incorporating natural habitats into agricultural areas has measurable benefits, including the increase of soil organisms that create healthy growing environments; the increase of pollinators and beneficial insects that help increase yields and control pests; and stable waterways that protect water quality, prevent erosion and help comply with federal and state regulations. Beyond these direct agricultural benefits, however, lie essential contributions to society and the biological community in general. To the extent we agriculturalists succeed at protecting wild biodiversity, we also profoundly deepen what we mean by “sustainability”.

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