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Honoring Creation and Tending the Garden: Amish Views of Biodiversity  
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*“And the Lord God took the man and put him into the garden of Eden to dress it and keep it.”*  
Genesis, Chapter 2 v. 15, The Bible.

## Introduction

The Amish people of North America represent a traditional agrarian Christian subculture that originated in Switzerland and Alsace in 1693 as an off-shoot of the Anabaptist branch of the Protestant Reformation (Smith 1957; Hostetler 1993). Today they can no longer be found in Europe. The North American Amish, located primarily in the states of Ohio, Pennsylvania, Iowa, and Indiana preserve much of their Germanic heritage in language (an oral folk German dialect (Buffington 1939) and culture and have evolved a highly interconnected social system of cooperative, mutualistic and unifying interactions which sustains them as a separate subculture. The primary unit of Amish society is a patriarchal family (Huntington 1956; Schreiber 1962; Hostetler 1993). Groups of families are tightly connected as parts of an Amish church community or **Gemeinde** (a redemptive community (Cronk 1981), in which personal salvation takes place in Christian community) who meet for worship in each others' homes and barns (Hostetler 1993). Each church community has its own lay church leaders and a set of socio-religious rules called the **Ordnung**, which create boundaries between them and the world and limits the scale of many aspects of their culture, including technology and farm operation (Hostetler 1993). For example, to encourage a slower pace of life and more local connectiveness, **Ordnungs** do not allow church members to own automobiles; horses and buggies are used instead (Hostetler 1993). Furthermore, only horses are allowed to be the main source of power in agricultural field work so that farm size is limited to what a family with a team of draft horses can manage (20 - 60 Ha.) (Kuhns 1989; Kline 1990; Hostetler 1993).

At the core of traditional Amish society is an agrarian lifestyle. Tilling the soil has religious significance for the Amish based on Biblical interpretations and as a result the Amish have a strong sense of land stewardship (Hostetler 1993). A visiting bishop from Pennsylvania was quoted as saying “we should conduct our lives as if Jesus would return today, but take care of the land as if He would not be coming for a thousand years” (Kline 1995a). In the view of many Amish, farming offers “a quieter life and one feels closer to God” (Stinner *et al.* 1989). For example, much plowing is done with walk-behind plows, in which feedback on soil condition is direct and there is time to observe and enjoy the clouds, birds and the beautiful pastoral landscape created by Amish farm communities. The rhythm of the northern temperate zone seasons and associated farming and religious rituals provides a deep sense of order to life for Amish farm families. The self-sufficient farming systems practiced by the Amish reinforces their cultural separateness and are an integral part of the culture's persistence and growth (Stinner *et al.* 1989; Hostetler 1993).

The Amish are believers in the Creation doctrine as given in Genesis in the Christian Bible (Hostetler 1993), and as such, all of creation (i.e., biodiversity) is viewed as God's handiwork to be honored. "...anyone who keeps an eye on the wonders of God's creation, cannot help but be impressed how all living things work together to keep things in balance. It is no accident, nor did all come to pass by some process of evolution as is so commonly believed in the world today. The creator of all life did a wonderful job with the planet we call earth and all the living things that live therein, in design and function, God left nothing undone, nor was any part of it planned haphazardly" (Christner 1996a). The belief that people are "tending the garden" provides the spiritual basis for values that promote biodiversity.

Since 1995, Stinner and Moore have been working with three Amish farm families in Holmes County, Ohio as case studies on research funded by the U. S. Department of Agriculture's Sustainable Agriculture Research and Education Program. An agroecosystem analysis approach (Conway 1985; Marten 1986) is being used in this study which integrates social, economic and ecological aspects of Amish agriculture, with a goal of using data and basic principles of sustainability from exemplary Amish farms and communities as possible alternatives for other societies. It is primarily from these three families, in three different church communities that we base our observations in this paper. Specifically, this paper explores the importance of holding a value to nurture biodiversity through integrating knowledge of biodiversity in everyday life. We write this article together with David Kline, a farmer, nature writer, and minister and his wife Elsie who with their family are one of the farms where we are conducting research.

## **Historical Influences on Amish Views of Nature and Biodiversity**

Historical environmental and socio-political aspects of the Amish culture have a strong bearing on contemporary Amish views of nature and biodiversity. When the Anabaptist Movement began in Zurich, Switzerland in 1525, its basic tenets of adult baptism and complete separation of church and state appealed to urban intellectuals and crafts people (Hostetler 1993), however, these tenets deeply threatened the existing political and religious order. Severe persecution was initiated soon after the movement began in the 16th century and continued into the 18th century throughout much of western Europe (Smith 1957). As a result of persecution, the movement moved out of the cities and into remote mountainous regions (e.g., the Jura and Vosges Mountains) where followers could be less easily found and became associated with peasants (Smith 1957 and Hostetler 1993). In these marginal lands and environmental zones, ancestors of the Amish were forced to adopt an ethic of environmental stewardship in order to survive and produce food (Smith 1957; Meyers 1983; Hostetler 1993). Eventually they became renowned as superior land stewards and innovative farmers (Correll 1925; Seguy 1973; Stinner *et al.* 1992).

A poem dating from 1681 (Klines, pers. com.) provides evidence of the love for and connection the early Anabaptists had with their harsh but beautiful mountain homelands. It tells the story of a young Anabaptist boy sadly looking back at his beloved mountains as he and his family are forced to leave because of religious persecution. Translated by the Amish, one verse reads:

Farewell you Alps, you beloved regions.  
You native village in the great valley!

You beloved fields, another will tell you.  
Oh house of my youth, you will I never see.  
God keep you! Farewell for the last time.

The grandeur of the Anabaptist ancestral homeland instilled a deep love of nature which is still carried in the cultural memory of the Amish people. This is viewed as a foundation of contemporary Amish views of and interactions with nature and biodiversity.

## Religious Aspects of Amish Views of Biodiversity

### The *Gelassenheit* Principle

Menno Simons, an early Anabaptist leader wrote, “All those born of God are called into one body and are prepared, by love to serve their neighbors” (Wenger 1956). The principle of yieldedness or ***Gelassenheit***, a term used by medieval mystics to indicate internal submission to God, structures much of their society (Cronk 1981). The power of love can be released only when self-will dies, and Amish communities are based on this idea of the power of powerlessness, as exemplified by the life of Christ (Cronk 1981). Work is a ritual sign of yieldedness (Cronk 1981). “And labour, working with our own hands: being reviled, we bless; being persecuted, we suffer it:” (I Cor. 4:12, *The Bible*). In keeping with the historical agrarian heritage of the Amish, living and working on family farms close to God’s creations, *i.e., the land and the biodiversity therein*, (instead of human creations) in context of redemptive and interdependent communities is the traditional way the Amish people have expressed these religious principles. In this sense, farming is viewed by Amish traditionalists as a “holy life”.

### Church Liturgy, Songs and Biblical Passages

Since the Amish have bi-weekly worship services, their liturgical calendar (***Schriften und Lieder***) is divided into twenty-six parts that reflect both religious holidays and agricultural seasons. Their liturgical year begins with the Christmas scriptures (***Christtag Schriften***), Luke 1 and 2 one Sunday and then two weeks later, Matthew 2 and 3. Since the Amish still hold January 6 as the day Jesus was born, their liturgical year also begins with the new year.

While many of their scripture readings and studies are connected with holy days, quite a few are associated with the agricultural seasons. Sometime in April, when the farmers are sowing clovers and oats, Matthew 13 and John 15 (***Säemann Schriften***) are read: “A sower went forth to sow”. In summer, John 4 and Revelations 14 (***Ernd Schriften***) is read, and then toward the end of summer when the grains have been gathered into the barns, appropriately the harvest scriptures (***Einsammeln Schriften***), Luke 12 and 13 will be used. Oftentimes the services are held in barns where the well-worn boards of the threshing floor are lightly covered with new hay and the granaries bulging with summer’s bounty of grain.

Their hymns likewise reflect the time of the year. The Amish *Ausband* is a book of Christian songs dating to the 1500's. Without notes, these songs are passed on orally by the Amish. While most of these songs tell stories of Anabaptist ancestors imprisoned for their faith in Europe in the 15th and 16th centuries (particularly in a prison in Passau, Germany), there are some that express an appreciation and knowledge of nature. For example, the Sunday the ***Säemann Schriften*** are read, hymn 47 is sung. In this beautiful song several stanzas are about the European skylark, which sings his wonderful courtship song as the farmers sow their seeds

in early spring.

***Die Lerch sich durch die Wolken schwang,  
Mit süsser Stimm und Weise***

(The lark wings through the clouds,  
With sweet voice and melody)

Even though all the scripture texts in the Amish register are from the New Testament, the Amish are well acquainted with and cherish the Old Testament. They have a long tradition of quoting ***Lob Sprüchlin*** (praise sayings) and most of those are from Psalms. In fact, their Luther translation of the New Testament used in church also contains the psalms. Favorite quotes from Psalms are:

- |         |  |
|---------|--|
| 118:24  | "This is the day the Lord has made;<br>we will rejoice and be glad in it."   |
| 19:1    | "The heavens declare the glory of God;<br>And the expanse shows his handiwork."  |
| 24:1    | "The earth is the Lord's and the fullness of it."<br>(Also reads the same in 1 Cor. 10:26).  |
| 96:1    | "O sing unto the Lord, all the earth."   |
| 121:1-2 | "I will lift up my eyes unto the hills.<br>Where shall my help come from?<br>My help comes from the Lord,<br>who made heaven and earth." |

Psalms 133 is sung in their communion services which are held twice a year; in the spring at Easter and in the fall at the end of harvest. Psalms 147 versus 1 - 5 are quoted many times. Likewise, Micah 6:8, "He has shown you, O man, what is good. And what does the Lord require of you but to do justice and to love mercy and to walk humbly with your God?" In a special Catholic service honoring Spirituality and the Land, invited speaker David Kline used Psalm 104 as the text for his presentation. "O, Lord, how manifold are thy works! In wisdom hast thou made them all: the earth is full of thy riches." Another verse from *The Bible* often quoted by the Amish which has implications for their relationship to nature and biodiversity is from Revelations (Rel. 11:18): ".....and [Thou] shouldest destroy them which destroy the earth". Of interest is the observation that in the Amish German Bible the word for destroy in "destroy the earth" is "**verderben**" which translates "to harm" rather than "to destroy".

## **Watersheds and Church Districts**

### Amish Church Districts and Watershed Stewardship

The manner in which a local population interacts with its watershed and ecological zones has a far-reaching effect on conservation and biodiversity. Settlement pattern is a function of both time and place. It relates to a time dimension because any society has a kinship system of which descent, inheritance, and succession play an important role in how the people distribute themselves over the terrain. Settlement pattern is likewise related to how the people interact with the watershed(s) in which they are located. We find that the Amish practice of single heir succession prevents land fragmentation and enhances conservation and biodiversity through long-term stewardship toward the farm land and its respective environmental zones. Amish church districts are based on 1). shared ideology 2). upper level population restrictions per

district; 3). common school districts and 4). common watershed topography. As a result watershed stewardship is evident in a number of ways ranging from management of woods corridors to preservation of watershed headwaters.

### Amish Patterns of Farm Succession

A key to Amish farm sustainability is the single heir succession of the family farm. While Amish practice bilateral descent with a patrilineal bias, succession of the farm may be by any one child and spouse, male or female. Many successors are first born males but last born male successors are not uncommon. Female successors are least common. The decision of who will be the successor rests with the parents who determine the terms of the agreement with the married successor and spouse regarding their purchase of the farm. The payments for the farm become the income for the retired grandparents who move over into a separate adjoining house.

Thus, from the Amish view, it is essential for the farm value to be something that can reasonably be achieved by the successor and his/her spouse. Rising real estate values resulting from tourism and population pressures are presenting a problem for these successors. There is a chronic shortage of farm land with many people desiring to farm. As a result there has been a rise in farms partitioning an acre or two for one or more of their non-successor children.

### Church Districts

Church districts are first determined by denomination. The Old Order and New Order are the major denominations and beyond these there are both conservative and liberal districts which are fewer in number. The chief articles of division are the degrees of "**Meidung**" (application of the ban and shunning), regulations concerning which farming methods and equipment should be used, and personal appearance and dress standards (Ohio Amish Directory 1996:XIV). Each church district determines its own standards so it is possible, for example, for one Old Order church district to use milking machines while the Old Order church district adjacent to it may still milk by hand. These decisions are made according to local interpretation of the Bible as it relates to local situations.

A second criterion for church districts is the number of households. When church districts membership reaches approximately 40 households, it splits into two districts of 20 each. This number is sufficient to maintain a sense of community for mutual aid. It is common for church districts to have 50-90 members not including a slightly larger unbaptized non-member group mainly of children. These divisions occur quite frequently owing to the rapid growth of the population. In Salt Creek Township, the total number of Amish farms was only 3% of the total in 1875 and gradually expanded to 31% in 1910, 82% in 1960, and 93% in 1994.

A third aspect of church districts is that there is a rough correspondence of church districts with Amish parochial schools. Approximately 2/3 of Amish children in the area attend parochial school which lasts through 8th grade. The other 1/3 attend the public schools. There were 112 Amish schools and 159 church districts in Holmes County and vicinity (Ohio Amish Directory 1996: XV, XXXIV).

It is common for church districts to belong to the same watershed. This is easily seen in many district names: Sugarcreek, Walnut Creek, Doughty Creek, Twin Creek, Applecreek, Martinscreek, Sharp Run, and Saltcreek. The propensity of the Amish to seek land with running water may be associated both with the 23rd Psalm and their image of self-sufficiency. Running water is a necessity for dairy cows and humans alike and serves to cool foods. Before electricity

was introduced spring houses were common for Amish and non-Amish alike. In a study of farm ownership in nine sections (one section is one square mile which equals 640 acres) of Salt Creek Township of Holmes County over the last 120 years we found a clear tendency for Amish farms to purchase farms with either a flowing stream or a headwater. This contrasted to the non-Amish farms in the same area which had many fewer streams or headwaters. Equally significant was the tendency for non-Amish farmers to displace headwaters. The 1875 and 1910 plat maps clearly show detailed headwaters with little change. However, these same headwater end branches are missing in 23 out of 44 cases (52%) on the 1960 plat map and USGS quadrangle maps. It is probable that many of these headwaters were plowed over or drain-tiled sometime between 1910 and 1960 with a significant loss of soil sediment and plant and animal biodiversity. We are in the process of understanding this process through study of more maps and conducting interviews with farmers. In any case, we see the same process in 9 sections of Mechanic Township.

Deforestation has occurred both independently from and as a part of displacing headwaters. The wooded area for the above 9 sections in Salt Creek Township represent 11% of the total acreage according to the 1961 aerial topographic maps. In the 9 sections of Mechanic Township 27% was wooded (USGS Berlin and New Bedford Quadrangle Maps, 7.5 Minute Topographic Series). According to the Population Censuses of 1860 and 1870, the percentage of wooded areas to total acreage was 29.6% and 27.4% respectively in Salt Creek Township (all sections) and 37.7% and 38.0% in Mechanic Township (all sections) so these two townships experienced some deforestation during the period in question, a part of which was in the riparian zones both internal and external to the headwater displacement.

## **Influences of Amish Land Management on Biodiversity**

### Amish Farming Practices

“...we farm the way we do because we believe in nurturing and supporting all our community - that includes people as well as land and wildlife” (Kline 1990). The farming practices used by today’s Amish farm families have developed over 300 years and sustained the Amish as one of the most persistent and successful subcultures in North America (Stinner *et al.* 1989; 1992). Their farming systems generally are much more diversified than non-Amish farms, and they are “solar powered” by draft horses (Belgians and Percherons in Holmes County) rather than fossil fuel powered (although small amounts of fossil fuel are used). Animal manure is valued highly for building and maintaining soil fertility and is the main source of fertility on the three farms in our study (low levels of chemical fertilizers are used by most Amish farmers). Although a growing number of Amish families are shifting into market vegetable production in Holmes County, dairy and diversified livestock farms still dominate. Natural breeding, with male animals instead of artificial insemination, is the primary breeding method for dairy cows, hogs and horses. This helps to increase genetic diversity within livestock species. Holsteins are the dominant dairy animal, although a few Amish farmers prefer smaller breeds such as Jerseys (Guernseys are preferred but existing gene lines do not meet with Amish farmer approval). Horses and cows all have names such as Tom, Barney, Maggie, Tony, and Linda and this helps both to identify and create a close bond with individual animals.

In addition to crop and animal production, many Amish farm families manage woodlots for hardwood lumber, wood stains, maple syrup, nuts, soil and fuel. All Amish families (even the

growing number who are not farm based) have vegetable gardens, which the women typically manage. Meat for the family is raised from chickens, hogs and bull calves. On the mixed livestock and dairy farms, a four to five year rotation of: hay (a mixture of *Trifolium pratense*, *T. hybridu*, *Medicago sativa* and *Phleum pratense*) - hay - corn (*Zea mays*) - (corn silage) - oats (*Avena sativa*) - spelts (emmer wheat, *Triticum dicoccum*)/wheat (*Triticum aestivum*/barley (*Hordeum vulgare*) is used. In addition to crops, Amish livestock farms have permanent meadows/pastures. Increasingly, some form of rotational grazing (Voisin 1960) is being used on pastures, hayfields and crop fields after harvest.

The diversity of crops with the rich sources of organic matter from legumes and manure create several ecological and economic benefits for Amish farm families which contribute to their sustainability. Most insect and disease cycles are broken, therefore there are few expenses for insecticides or fungicides and healthy communities of beneficial below- and above-ground organisms. Soil quality is good and fertility levels are sufficient for high levels of production with low purchased fertility costs. Our research to date indicates that the case study farms are operating on extremely efficient nutrient cycles for nitrogen. Finally, Amish farming practices create a diversity of ecological zones which serve as habitat for rich biodiversity on their farms and in their communities which is an important quality of life value for many Amish families.

The Amish still tend, as a rule, to pay attention to the signs of nature as a planting guide in the spring rather than following solely the date on the calendar. For example, clover is best sown when the ground reaches a “honeycombed” state brought about by the freezing and thawing of the soil. When the serviceberry, **zarvis**, (a flowering tree and shrub, (*Amelanchier arborea*) blooms, it is an indication that the soil temperature is warm enough to sow the oats, **haver**. (This usually occurs around mid-April. However the flowering of the serviceberry can vary up to three weeks; from early April to May). Several weeks after the serviceberry has bloomed, the dogwoods (*Cornus florida*, or **hundsholz** to the Amish) burst forth in bloom and the young leaves on the white oaks (*Quercus albus*, **weis acha**) will be the size of a squirrel’s foot and the soil is ready for the corn, **velshcon**. When the first monarch butterfly (*Danus plexippus*) comes winging across the hayfield it is time to think about cutting the hay. Watching barometric pressure, reading weather forecasts, cloud watching (Kline 1997) and “gut” feeling are used to decide precisely when to mow hay, which needs three days of sunshine to cure properly to be stored for the winter months.

The Amish still prefer the traditional mixture of clover (primarily medium red clover (*Trifolium pratense*) and some alsike (*Trifolium hybridu*), alfalfa (*Medicago sativa*), and timothy (*Phleum pratense*) for their hayfields. Not only does this diversity assure a good crop of hay, it also makes a much more attractive and interesting field for humans, domestic animals, and wildlife. A mixed hayfield in early to mid-June is a colorful and delightful place to be. Bobolinks (*Dolichonyx oryzivorus*) abound in its varied habitat and so do many other species of birds and mammals (Kline 1990; 1995b). Butterflies (**sommer vögel** to the Amish), too, congregate in the hayfields to feed on the sweet nectar of the clover blossoms. Mixed hayfields tend to mature later than alfalfa/orchard grass (*Medicago sativa*/*Dactylis glomerata*) hayfields now so common in industrial farming. Thus the late-nesting bobolinks have much better nesting success in the clover/mixed hayfields (Kline 1990), and indeed, bobolinks are observed much more frequently on Amish farms than non-Amish farms.

Some Amish still grow heirloom varieties of open-pollinated field corn (usually raised for millers who grind it into corn meal for human use), but the majority of Amish farmers plant hybrid

varieties of field and sweet corn. Interestingly, what we have found is that even though the seed corn is purchased, they prefer to buy from small family-owned seed corn companies such as Yoder's, Doeblers and Rupp instead of buying from the giant seed corporations. As a result, Amish farmers are helping to preserve genetic diversity of maize.

Amish farmers also watch the weed plants on their land as indicators of soil deficiencies. Sorrel (*Rumex acetocella* or *R. acetosa*; **sauer ronga** to the Amish) is one plant that indicates a soil with low pH. Often sorrel is seen along field's edges where no lime was spread recently. Quack grass (*Agropyron repens*) as persistent pesky alien grass, thrives on soils deficient in calcium. Even pest insects such as alfalfa weevil (*Hypera postica*) are more of a problem when the soil nutrients are out of balance (Phelan *et al.* 1995; Phelan *et al.* 1997). As the Amish say, "**das unzunt Tier hut die Lice**" (the unthrifty animal has the lice).

While the majority of Amish enjoy wild fruits such as black and red raspberries (*Rubus spp.*) and elderberries (*Sambucus canadensis*, **hulla berrha**), many odd corners and some fencerows on their farms are left to grow wild and free for the pleasure of their families and the neighbors. Of course, these brambles then provide food and shelter for a host of wild things (Kline 1990). When their children pick blackberries in late July the fencerows still ring with birdsong. Gray catbirds (*Dumetella carolinensis*) scold, common yellowthroats (*Geothlypis trichas*) and house wrens ((*Troglodytes aedon*) **zank hahne**) sing, so do the song and field sparrows (*Melospiza melodia*, **schpätzli** and *Spizella pusilla*). In the heat of the "Dog Days" of August a myriad of insects buzz, chirp and rasp, adding to the joy of the time and season.

### Flexible Farm Management

Social systems that promote sustainability must have either a low level of system perturbations or some type of regulating mechanism (E.P. Odum 1962) to provide for flexibility (Moore 1996).

It is also expected that such systems provide means for characterizing (Conkin 1954; 1957) and accessing local knowledge (Geertz 1993; Brush 1996) including strategies to maintain biodiversity (Moran 1996, Orlove 1996) and to respond appropriately to abnormal system fluxuations. The role of a flexible farm management system is to maintain natural cycles on the farm through understanding these cycles. Unexpected events such as a hard frost, a dearth of honeybees, or a leaf virus may set in motion a series of events that push the system out of equilibrium.

Rotations can be varied somewhat. For example, the winter of 1995-96 damaged the spelts crop so some farmers plowed under the spelts in the spring and grew a second year of corn there instead. Also to be factored in was the fact that corn was somewhat in short supply from the previous year. It is possible to grow three years of hay if the combination of legumes seems appropriate. There are approximately 10 parcels per farm with an equal number of subplots as defined by the farmers. Usually subplots were defined through combining soil and drainage types with physical land features such as "nob of the hill". Manure applications in the late winter/early spring are applied according to subplots by easing the lever on the manure spreader. Several corn varieties are always planted because it is important to have both silage corn and feed corn. The faster maturing varieties such as 90 day corn are usually planted around the outside of a corn plot so that it will mature in September before the longer varieties so that household labor will be more evenly distributed. Some long-eared varieties of corn are hand picked and corn is stacked in shocks.



Families normally do the shock spelts harvesting together (involves cutting and binding the grain, then shocking it). Oats, wheat and barley are harvested by threshing rings usually consisting of 4-6 neighbors sharing a threshing machine. The order of which farm to harvest first depends on which farm's grains mature first. The silo filling rings consist of as many as 8 to 15 different farmers helping a person put corn silage into the silo. The rings are slightly overlapping so that the membership of the rings of adjacent farms vary slightly. Coordinating the silo filling schedule, therefore, is quite challenging. One has to take into account not only the crop maturing status of immediate neighbors's corn but also a large group of farms many of which are outside one's own ring. This scheduling must also avoid double-booking someone to attend the silo filling of two different farms at the same time. Membership in threshing and silo rings also changes over time according to the needs of individual farms. Tasks in production as well as the communal meals afterwards are age and gender specific. Women help harvest spelts and can do oat threshing and hay baling but not silo filling because there is heavy lifting involved.

Labor and equipment exchanges happen on an almost weekly basis. This is particularly true for families with young children where the wife is busy taking care of the children. Youth in their teens or twenties work on other farms depending on the family and church relationship. Church members sometimes help their church leaders (1 bishop, 2 ministers and 1 deacon per church district) harvest their corn or provide firewood. Some individuals may possess specialized equipment such as a "right-handed plow". This provides a good "excuse" to get together and plow with someone with the more common "left-handed plow" (particularly in Holmes County) so that the horse teams can plow in opposite directions.

## **Local Knowledge**

Local knowledge is the information and communicative means to maintain a viable and flexible farm management system and a rich quality of life. Knowledge gained from the experience of farming is passed on orally through everyday life examples. Both elderly and young alike pass on critical information. Amish are sometimes described as "traditional" but local knowledge is a very dynamic process of incorporating local experience to the current situation. It is based on local experience, local social relations, and local environment. For example, children see on their own farms that fireflies are most abundant over the oat fields, but this information is also reinforced by the parents, grandparents, and neighbors who tell stories about fireflies.

While most Amish enjoy nature and prefer to live in rural areas with their pastoral landscapes, detailed knowledge of local flora and fauna is widely variable, from in-depth to relatively little. In the case of David Kline (author of two books on nature and local biodiversity and many essays for magazines and the Daily Record newspaper in Wooster, OH), much of his knowledge was learned from his father and his and his father's naturalist school teacher; who not only taught directly, but instilled in his students a great appreciation of local biodiversity and a desire to learn on their own (Kline 1997). Science, per SE, is not taught in Amish classrooms (Hostetler 1993), but natural history is, particularly in schools where the teachers come from backgrounds which valued such knowledge. For example, in the Boontown School where two of the Klines' daughters teach, the students have been exposed to considerable knowledge on local biodiversity.

Another important source of information on local biodiversity are field guides, both commercially

available ones, like the Peterson Field Guide series and some published specifically for Amish children and families. Elsie Kline did not know many birds when she and David first started their farm list (Table 1), but she learned from David and field guides and now has enviable knowledge of the birds that live on or visit their farm. A second case study farmer is collecting numerous field guides on wildflowers, medicinal plants, insects, butterflies, trees, mushrooms, to teach himself and his children and to encourage students in their church's school (of which he is a board member) to learn. In the third case study farm family, the children were marking the names of birds cited in a booklet *The Birds of Holmes and Wayne Counties* published by a local Amish teacher (Dennis Kline 1996).

A review of recent issues of three magazines found in many Amish homes gives some indication of their appreciation of the natural world and knowledge of local biodiversity. **Family Life** is designed for adults and children. **Young Companion** is targeted toward teenagers and young people preparing for marriage. **Blackboard Bulletin** supports Amish schoolteachers. While the majority of articles in these magazines deal with spiritual/moral teachings and daily life issues for "plain people", there are numerous poems and stories on nature, and quizzes and crossword puzzles testing readers knowledge of biodiversity, usually of local fauna. For example, in nine issues of **Family Life**, there was an average of 4 articles per issue on nature or some aspect related to biodiversity. There are two semi-regular features titled: "*Marvels of Nature*" and "*Along Nature's Trails*", including, for example, articles on insects (Christner 1996a; 1996b), turtles (Christner 1996c), and butterflies (Brenner 1996).

In thirteen issues of **Young Companion** there was an average of 1.7 articles per issue on nature and biodiversity. Of particular relevance, were quizzes written by a young author on birds nests (Byler 1996) and winter birds (Byler 1997), in which at the end of 37 questions 15 year old Byler says, "...if you had more than three wrong, you'd better spend more time at your window, watching the birds at the feeder." Bird feeders can also be located out of sight in wooded areas. **Blackboard Bulletin** had fewer relevant articles than the other two publications, with an average of 1 article per issue in a sample set of 11 issues. The "*Puzzle Page*" feature in this magazine often had nature related themes, for example, "Our Feathered Friends" (Wagler 1996) and "The Nature Walk" in which students are to fill in the blank spaces with the names of more than fifty things they might see on a nature walk (Anon. 1996a).

A few of the articles express the idea of humans learning important spiritual lessons from other creatures. For example, in "Inspired by Nature - Taught by a Titmouse" the anonymous writer tells of being depressed and watching a titmouse at the birdfeeder taking seed after seed to a nearby branch and hammering them open for the food within. "*Suddenly a thought entered my mind. As the titmouse keeps flying back for food, I must keep on returning to the Throne of Grace for patience and help to overcome my faults. And if God gives me a hard trial, I must, with Holy Spirit's help, break it until at last in the end it discloses the "food" I need....And as my little feathered friend sings praise, so may I too bring songs of praise to our Creator. Dear little birds, how many lessons you teach me as you brighten my days.*" The article is signed "-Renewed in Spirit" (Anon. 1996b). A similar theme is poetically expressed in "Song of the Spider" by Miller (1996).

*"I've found a place my silk to spin;  
This mansion I am living in.  
Though often hindered, I begin  
To build a spider web.*

*Learning from the lowly spider,*

*learning how to be  
Wise and willing.  
With a spider  
God is teaching me."*

### Bird Lists

"Living as we do in the country, surrounded by woods and fields and streams, birds are very much a part of our everyday lives. Recording the different kinds we see sharpens our awareness and makes us appreciate even more God's most beautiful and varied creations" (Kline, 1990). The Kline family keep two bird lists: 1) a list of all the birds they have seen on or flying over their farm, and 2) a yearly list of all birds they see on their farm and wherever they might travel. The farm list is kept in a record book and the annual list is hung on their kitchen wall and has family drawings of the birds decorating it (Kline 1990). A total of 177 species are on the farm list, which was begun soon after David and Elsie were married. Their children have been active participants. However, "our interest in birds isn't solely in learning their names so they can be recorded on a list, but rather in learning about the birds, watching their adventures and studying their ways." (Kline 1990). Table 1 shows the Kline's list of birds which nest on the farm in the ecological zones the Klines associate them. A representative list of migrant species is also included. Dialect names are given for species that have them, however most species are known to the Amish by their English names. Of special interest is the dialect name for the American Robin, **Amsel**, which is more taxonomically correct than the English common name. The Amsel in Europe is a bird which looks different from the North American species but it is in the same family (*Turdidae*). Early Amish settlers accurately observed that it had similar songs and behavior to the common American bird. The English robin red-breast, however, which looks like the American species and for which the English settlers named it, is in a different family. This is an example of what astute observers of nature the Amish can be. See Kline (1990; 1997) for many stories about the birds that have "shared our space on earth" (Kline 1990).

### Mushroom Hunting

Hand in hand with spring bird watching goes mushroom hunting. During the peak spring season people may go mushroom hunting as often as every three days. Morels (*Morchella spp.*) are the fungal delicacy sought after and are usually rinsed in salt water and sauteed in butter. "Actually, hunting for morels isn't any effort at all. In fact, it is a sensation of deep pleasure simply to slip away for an hour or two to be among the great variety of wild living things; the flowers - trillium, saxifrage, phlox, and ragwort, the flowering trees; the birds - migrating warblers, singing vireos and tanagers and wood thrushes, gobbling wild turkeys; and even the soon-to-be-gone woodland fungi. What more could one desire?" (Kline 1997). Following the elm tree blight, many more mushrooms were spotted at the base of these trees. Other spring and summer species are commonly known and collected, including: lilac oyster mushrooms (*Pleurotus sapidus*), shaggy-manes (*Coprinus comatus*), hen of the woods (*Grifolia frondosus*) and meadow mushrooms (*Agaricus campestris*). Fall mushroom hunting is less common because people are fearful of poisonous species (Kline 1994). However, there are two late summer and fall species that are collected by some Amish: sulphur shelves (*Polyporus sulphureus*) and edible puffballs (*Calvitia gigantea*).

### Butterfly Lists

Butterflies are another faunal group of special interest to some Amish. Flowers attractive to butterflies may be planted and "list" kept. "Butterfly watching provides a delightful nature alternative [to bird watching] for the summer months. Few other subjects in nature offer the exquisite beauty that butterflies do." (Kline 1995c). The arrival of Monarch butterflies is an important seasonal marker for the Kline family. The spring of 1996 was extremely wet and unusual in north central Ohio. The monarchs usually arrive during the first week of June, but that year it was May 30. "I tend to look for large meanings in small things; each event or step in the progression of the season, no matter how minor or minute, is worthy of notice. On May 30 one of those small events caught my eye - the spring's first monarch butterfly arrived on our farm...." (David Kline 1996). Table 2 shows species that Elsie Kline has identified in her vegetable garden and around the farmstead buildings. Figure 1 shows a typical drawing found on the wall of Boontown School. This tiger swallowtail (*Papilio glaucus*), for example, is an indicator of relative moisture as well as dependent upon a wide variety of trees during its caterpillar stage. In 1996 each pupil in this two room schoolhouse had his or her name next to a hand-drawn local butterfly. In general, butterfly populations are viewed as an indicator of overall health of the farm. When they are on time David Kline feels "things are well".

The elderly hold a cache of knowledge concerning past experience which comes in handy when unusual weather or pest cycles present themselves. For example, in the spring of 1996 steady rains prevented a timely planting for most farmers but the elderly quickly compared it to the spring rains of 1947. Their advice was critical in helping farmers utilize the high number of subplots which provided opportunities for the draft horses to plow fields that had drained. Plowing techniques were modified to enable plowing in wetter conditions ) and muddy or poorly drained spots were temporarily skipped. This contrasted with the conventional cornbelt farmers who were not able to plant until the end of June--a full month and a half after normal scheduled planting

## **Biodiversity**

While widespread surveys of biodiversity in Amish farming communities have not been conducted, it is clear that the small scale and diversity of cropping patterns in time and space create very different landscape patterns than conventional large-scale industrialized farming communities (Stinner et al 1989). The numerous ecological edges and corridors (Baudry 1989) in Amish landscapes created by fencerows, woodlots, meadows, riparian strips and diverse cropping fields are most certainly habitat for a great diversity of flora and fauna.

### Woodlots - Plant Species and Relative Abundance

The woodland plant data shown in Table 3 was collected from transects (3 each on Klines and Hershbergers and 2 on Kuhns because of small acreage) in each of the three case study farm woodlots mid-summer 1996. A qualitative ranking system was used to indicate relative abundance, with 1 being rare and 5 being very abundant. The lists were shown to the families and they were asked to comment on species that had particular significance to them. Dialect names are given for plants that have local names. As with the birds, dialect names often reflect species that looked like European species to the original Amish settlers. For most native species, they use the common English names. Trees are often associated with birds. For example, one dead elm tree was not cut down because it was a good lookout tower for hawks. It was pointed out that another elm tree hosted the nest of a redtail hawk. We were told that

many Amish families have a healing salve recipe which includes wild plants, but this was not the case for any of the families we are working with. Herbal medicine is a tradition among the Amish that has a long history back into Europe (Seguy 1978) and local **brachers** (healers) do exist. One of our case study farmers is very interested in encouraging Amish students to begin learning local medicinal plants while they are still in school, in hopes that one will grow into a healer for the community. A few Amish herbalists collect and use wild plants medicinally, however most use pre-prepared herbs. Herbal teas such as penny royal from the woods, peppermint from the permanent pasture, and sage and spearmint from the garden are mixed together. Dandelion wine is used to cure “threshing sickness” which comes about from the dust associated with the person who remains in the barn during threshing.

Woodlots are usually associated with watershed headwaters, springs, bogs, or creeks and accordingly form a corridor for wildlife that transcends private property of individual farms. Men frequently use each other’s woods for hunting and go by themselves, in small family groups, and in neighborhood groups. It is not uncommon to cross over fence lines of four or five farms in the course of a deer hunt. On the three farms we found differing degrees of forest maturity ranging from one that had sold lumber ten years ago to one that has never been cut. In the more mature woodlots, specific trees were earmarked for future use such as elm and poplar for barns, sheds, corn crib and house construction. Because some farms have gas wells used for their own heating, wood from the lot is often exchanged for labor from close relatives. Women use soil from the garden to enrich the soil of their flower beds and vegetable gardens. One farm had a hut built in the woods for the girls to play in and sleep overnight and all farms take family picnics in the woods. At the age of eight or nine a young boy might be taught the art of trapping fox, muskrat, and raccoon as well as accompany their fathers and grandfathers when they go hunting. The older boys in their teens go raccoon, rabbit, and turkey hunting and shoot ground hogs, chipmunks, deer, squirrels, raccoons which eat the corn on the stalk. Depending on the animal, hunters use shotguns, 22’s, muzzle loader, or bow and arrow. Animals are appreciated beyond their hunting value, however. “A family of foxes on the farm make it a better place to live” (Kline 1995b). Afforestation efforts are continual. For example, because the American chestnut tree (*Castanea dentata*) population was decimated by a blight (caused by a pathogen, *Endothia parasitica*) during this century, resistant varieties were planted in replacement by one farmer.

#### Larksong Farm or - “Elsie’s Garden”

The family vegetable garden is the domain of Amish women and working in the garden is an important quality of life value for them. They not only derive satisfaction from growing their family’s food, but also in creating spaces of great beauty on the farmstead. Colorful and diverse flowers intersperse carefully tended vegetables. Butterflies of many kinds flit about (Table 2). Often nearby the gardens are the orchards where a diverse array of birds nest and feed (Table 1).

Larksong Farm is Elsie Kline’s subscription garden or Community Supported Agriculture (CSA) project. Members pay an annual fee and in return get a large variety of fresh organic produce. One afternoon a week is “garden ladies” day when members come to pick up the week’s bounty. Many varieties of vegetables are grown (Table 4), including several heirloom varieties such as: *Lazy Wife Beans*, from Elsie’s aunt; *Rob Ada Lettuce*, which was given to Elsie by Rob Ada; and an very old pink rose (*Rosa sp.*). (The Klines also have a peach and red plum tree which are heirlooms). Many seeds and varieties of plants are exchanged among family, friends and neighbors. Elsie received most of her herbs in this way. This is an example of how Amish

women are preserving genetic diversity of domesticated garden plants.

## Conclusions

Based on our detailed study of three Amish farm families we realize that Amish farming stewardship and knowledge of local biodiversity begins with religious values about quality of life that resonate from field to watershed. The farmers we have described probably represent a higher than average level of both the stewardship ethic and knowledge of biodiversity but we have also examined them in the context of their church districts and watersheds and have found the tendencies and trends described herein to be common elsewhere among farms within these units. Examples of Amish farmers intensifying production and losing this ethic and knowledge are becoming more common due to the growing population problem, lack of farm land, increased wage labor, and commercialization. Our study concurs with Stinner *et al.* (1997) that increased biodiversity on farms has other positive impacts ecologically, economically, and socially on their quality of life. Nature's "free services" (Odum 1997) are reaped in many forms ranging from "free" fertilizer from the manure of cows and horses to the "free" pest removal by the multitude of birds constantly flying overhead.

For the families in our study, living and working close to the land surrounded by a diverse array of their God's creations is a very important part of their quality of life, making life more joyful. Their workplace and homeplace is one and the same which seems to cultivate a deep connection to their place on earth and the flora and fauna that share it with them. Their small-scale animal powered farming practices create diverse habitats to maintain rich biodiversity on their farms and communities, which sustains not only their spirits but also their economic and ecological viability.

By choosing to live "simple lives" with low levels of fossil-fuel based technologies, they interact in complex ways with the natural environment and biodiversity through managing their ecosystem on a daily basis. Their slower pace of life and non-industrial technology seem to offer them opportunities to observe and learn from nature if they are so inclined. "We often joke that where tractors can plow a six-acre field in two hours, I figure two days - but my time includes listening to vesper sparrows and meadowlarks and watching clouds scud across the sky" (Kline 1997). Since the Amish choose not to have radio and television, they naturally watch the signs of nature - the song of the cardinal and robin, the leaves on the maples, the wind and the clouds.

The theology for living espoused by Kline (1995a) summarizes at least one Amish person's view the spiritual value of biodiversity: "Am I wrong in believing that if one's livelihood comes from out of the earth, from the land, from creation, on a sensible scale, where we are a part of the unfolding of the seasons, experience the blessings of drought-ending rains, and see God's hand in all creation, a theology for living should be as natural as the rainbow following a summer's storm? And then we can pray, "**Und lasz uns deine Creaturen und Geschöpf nicht verderben...** And help us to walk gently on the earth and to love and nurture your creation and handiwork...."

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