



Rural-Urban Interface Problems and Opportunities

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In many areas increasing numbers of people are moving onto small acreages or housing developments that are being located next to farmland. The result is often unhappiness as newcomers and old-timers with different expectations suddenly find themselves in conflict over issues such as noise, dust, odor, and scenic values. Here are a few representative scenarios:

- The farmer needs to harvest a crop as quickly as possible to avoid losing it to bad weather. The homeowner is kept awake by the noise and lights of the equipment.
- The farmer needs to prepare the land for planting. The homeowner greatly resents the blowing dust.
- The new homeowners bring with them better roads, security lighting, and other "improvements." The long term residents dislike the faster traffic, increases in car accidents, and their inability to see the stars anymore.

Farming with residential areas nearby is difficult. Living next door to a farm is likewise challenging, especially if you did not know what you were getting into when you moved. Often both sides feel they have been wronged and turn to government officials or the courts to support their side of the argument. Arguments typically end up being expensive for both sides and often there is no clear winner.

Part of the problem is that people who are new to rural areas may not understand what farming involves. Blowing dust from newly plowed fields can be reduced, but not eliminated. Odors associated with animal wastes can likewise be reduced, but perhaps not enough to satisfy those with sensitive noses. Harvesting crops is noisy and apt to disturb the sleep of neighbors. Farmers accept all these and other nuisances as the price of enjoying a lush crop growing or hay being cut, dried, and baled. New rural residents usually enjoy the same scenes, but fail to recognize the need for the less pleasing agricultural activities.

On the positive side, an influx of people into a rural area means that roads, utilities, and other services may change in ways that most will see as positive. Road signs, county-wide 911, rural fire and ambulance service, and many other improvements have been made by communities across the state taking advantage of rural development planning expertise from the Oklahoma Cooperative Extension Service.

Working Toward Solutions

When a cooperative attitude is established between people, mutually beneficial solutions are possible.

- Many conflicts between farmer and rural homeowners can be avoided through better **communication**. Neighbors

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need to talk to each other, discuss goals for the future of the land, and understand the need for compromises. Too often people pursue their own goals never thinking of anyone else until a conflict occurs. Community leaders should recognize that the "Us-Them" mentality is counterproductive and take steps to facilitate communication between different groups.

- **Planning** is essential in order to implement the most effective solutions. Leaving adequate separation distances between homes and farming activities is always desirable. The key is that all involved landowners must start communicating early and thinking about community as well as individual benefits.
- Protect or create **buffer areas** between farming operations and homes. Maintaining a good distance between farming operations and homes, in conjunction with source reduction efforts, is the best solution for odor and dust problems. Buffer areas also work well on most other problems.
- **Windbreaks and shelterbelts** are old ideas that are coming back in many parts of the country. In addition to benefiting the farm, trees can greatly reduce the level of light, noise, and dust. Trees can reduce odor by increasing dispersal through turbulence. Tree foliage also captures a limited amount of odorous gasses. Contact your local Oklahoma Department of Agriculture, Food, and Forestry - Forestry Services office for advice on establishing windbreaks and shelterbelts. More information on windbreaks is also available at <http://www.ianrpubs.unl.edu/sendlt/ec1772.pdf>.
- Agricultural and other **easements** can be implemented by forward thinking landowners to restrict the uses of property, often in perpetuity. For example, land placed into a perpetual agricultural easement will never be used for housing developments, strip malls, etc. Many government agencies and private entities are interested in protecting land uses that support agriculture and/or wildlife.
- When a serious conflict does arise, **mediation** is usually a much better choice than litigation. A trained mediator can often help both parties arrive at a solution in less time and for a much lower cost than the court system. Oklahoma State University offers such help through the Oklahoma Agriculture Mediation Program. For more information about this service, citizens should contact their county's Cooperative Extension Office.

Agriculture adds much to our quality of life, beyond food. On average, a well-managed farm is much more beneficial to the environment than a typical residential neighborhood. Well managed farms protect soil and water resources and can be very pleasing to the eye. However, farming loses if it is a matter of a few farmers against many homeowners. Farmers should realize this and understand it is to their benefit to work towards cooperative solutions.

The Bigger Picture – Long Term Damage

When rural land changes hands and newcomers begin moving onto smaller acreages or into housing developments, environmental damage may be a consequence. The very things that drew people to the countryside are often at risk – things like clean water, scenery, and an environment that supports desirable plants and wildlife. Poorly managed roads, construction, and other activities can erode soil, deposit sediment in creeks and lakes, and increase runoff. When too many homes are located in an area, natural fires are suppressed and beneficial prescribed fire may be too risky. As a result, eastern redcedar and other undesirable plant species can crowd out desirable species. Visual blight can also be a problem; one person's business can be another person's eyesore. The list of negative consequences associated with unplanned rural growth is a long one.

Citizens should visit with their leaders about their vision for the future of lakes, streams, productive farmland, scenery, and other environmental assets. Are there trends that threaten these assets, like the spread of eastern redcedar or rapidly eroding roads? It is important to consider the long range impact of failing to attempt mitigation of such negative trends. Farmland, residential developments, and wildland can only coexist if potential negative impacts are recognized and dealt with by all major stakeholder groups. If rapport can be established and good guy-bad guy stereotyping avoided, then compromise and consensus can improve the rural landscape.

Conclusion

There are basically three choices for shaping the future of the rural landscape:

Education and Voluntary Action

People need to learn about the entire range of land use options so they can make informed choices. Education and facilitation of discussion between stakeholders is essential if farmers and rural residents are to shape a desirable future. A neighborly attitude and good community leadership are essential if this approach is to work. A variety of state and federal agencies have expertise in different land use practices and community development. Educational programs are usually available through them.

Regulation

Good regulation requires community approval and participation as well as an understanding of the needs and problems of an area. Regulations can "grandfather in" existing land uses to minimize the impact on current landowners. Because most counties lack the funds to properly implement regulations and rural voters typically resist the idea of being regulated, this option is not likely to be widely implemented in the near term. For counties experiencing rapid growth, this may be the best option.

Do Nothing

This is the current mode in many locations. It usually results in a degraded environment and quality of life. Prevention is always cheaper than trying to restore a degraded landscape and community.

Which will the people of your community choose?

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Water Gardens – A Low Management Approach

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When properly planned and managed, water gardens are restful, relaxing, and beautiful additions to any landscape. However, if you get started on the wrong foot, your water garden will be difficult or even stressful to manage. This publication promotes a low intensity approach to water gardening and attempts to dispel some common misconceptions that can lead to problems in managing a water garden.



Water Gardens Are Not Pet Fish Aquaria

Most of us have some experience in managing an aquarium. This can lead to problems if we assume that a water garden must be managed in the same way.

Feeding of water garden fish is not required when fish are stocked lightly. A stocking rate of one fish per 5 square feet of surface area should allow fish to do well foraging for natural food. In new water gardens, where natural food is not yet plentiful, stock fish that are less than 6 inches long.

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If you do choose to feed your fish, be careful not to overfeed. Excess fish waste and uneaten feed quickly degrade water quality. This problem is more likely when fish are overstocked, have grown large over time, or too much "recreational" feeding occurs. Dense green, turbid pond water; elevated ammonia levels; and even fish death due to poor water quality can result from overfeeding. Water exchanges and reduced feeding are generally recommended if dense green water or fish distress are observed as a result of overfeeding.

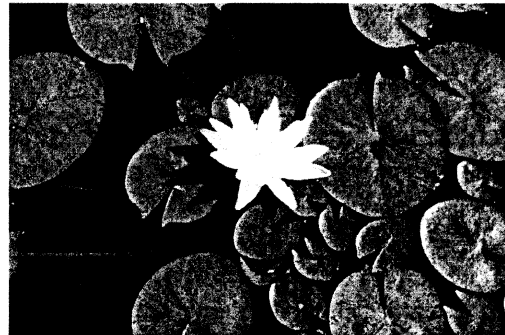
Water Gardens Are Not Swimming Pools

Some of us are familiar with the management of swimming pools. The use of chemicals and expensive filters to keep water crystal clear is incompatible with a water garden that functions according to the principles of nature.

Aquatic plants are the best way to filter and treat the wastes produced by fish in a water garden. Plants include microscopic phytoplankton, which at times cause the water to take on a greenish color. This is normal. It is also normal for algae to grow on waterfalls. Chemical control of these two types of plants is impractical.

The "higher" aquatic plants, such as lilies, arrowheads, etc., help limit the growth of algae and phytoplankton by competing for light and nutrients. A common recommendation for preventing excessive growth of algae and phytoplankton is to add enough aquatic plants to shade 50 to 75 percent of the pond's surface.

Purchasing and using a water quality test kit is not required for a properly managed pond where feed is not used or is used very conservatively. It is not unusual for water gardeners



to be overly concerned with water quality measures like pH. The pH in water gardens follows a daily cycle with the highest level occurring in the afternoon, especially when there is a "bloom" of microscopic algae. It is not necessary or desirable to chemically adjust the pH as long as it stays between 6.0 and 9.0 most of the time.

Expensive Is Not Always Better

The more expensive water garden is not always the better one. For instance, be aware that expensive filtration systems require regular maintenance and can be overloaded by too many fish and too much fish feed. The least expensive and most reliable method of avoiding water quality problems is to stock small numbers of fish and limit or totally skip the use of fish feed.

There are expensive and inexpensive options when choosing fish. Investigate the advantages and disadvantages of both goldfish and koi before choosing between the two. Goldfish are hardy and available in a variety of pleasing color patterns, similar to koi. Choose goldfish varieties that have a simple body form suited to quick swimming. Avoid those with extra large fins or bulging eyes etc. Koi require a larger pond but have a distinctive beauty. Koi with prized color patterns are quite costly but others can be very inexpensive. A beginning water gardener is probably better off with goldfish, especially if their pond will be less than 1000 gallons in size. Native fish species are an interesting but more challenging third option.

After you have selected the type of fish you will use, fish health is of greatest concern. Inspect fish closely and reject any that hang close to the water surface, have whitish dots on their surface, or display poor balance or other abnormalities.

Pond liners are one item on which spending more money is probably better. Be sure to use a liner material specifically designed for ponds.

Water Gardens Are Ecosystems

Almost everyone is familiar with the term "ecosystem" but few people truly understand how one works. Figure 1 illustrates the poor water garden management practices that occur when ecological principles are overlooked.

As a water gardener you have a unique opportunity to closely observe an aquatic ecosystem in action and to influence it through your management. Begin by learning the "parts" of your water garden ecosystem. These are the...

- Producers - the higher plants and algae
- Primary Consumers - the insects and tiny zooplankton

- Secondary Consumers - the fish
- Decomposers - the bacteria and fungi

Figure 2 illustrates the parts of a water garden ecosystem and how they interact to form a balanced system. The energy of the sun supports the growth of plants, which in turn are food for the tiny zooplankton and insects, which in turn are food for fish. The decomposers feed on wastes and dead material. This releases nutrients that are used by the plants. A pyramid is often used to picture the relationship of producers, primary consumers, and secondary consumers. A stable ecosystem requires a large amount of plants in the base of the pyramid to support a smaller amount of insects and zooplankton. At the peak of the pyramid and smallest in total weight are the fish.

The clarity of pond water changes rapidly with the growth and die-off of microscopic algae known as phytoplankton. The coming and going of phytoplankton "blooms" is natural and should not be a cause for undue alarm, especially in the first year when the higher plants have not yet reached full size. These microscopic plants and the other plants you add to the pond are the foundation of the pond ecosystem upon which everything else depends.

A step above the plants, are the zooplankton and insects. You may be able to see a few of the tiny zooplankton, by collecting a clear plastic baggie of pond water. Seal it and hold it at an angle so that one corner is down. The zooplankton will tend to collect in the bottom corner – look for tiny spots that jump.

Some of the most noticeable insects in and around water gardens are the dragonflies and damselflies. As they buzz

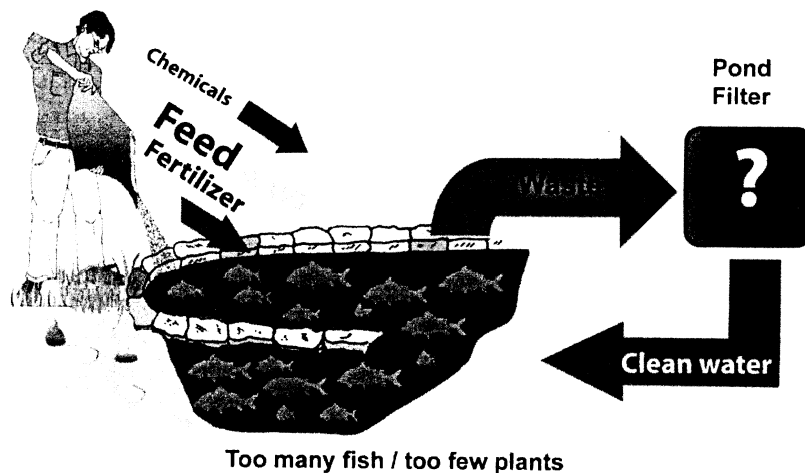
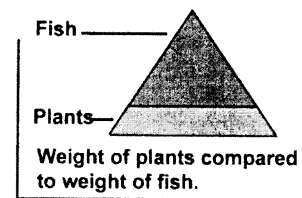


Figure 1. The common, but incorrect, view of how water gardens should be managed. Problems are sure to occur due to overstocking of fish; too little plant cover; and overuse of feed, fertilizer, and chemicals.

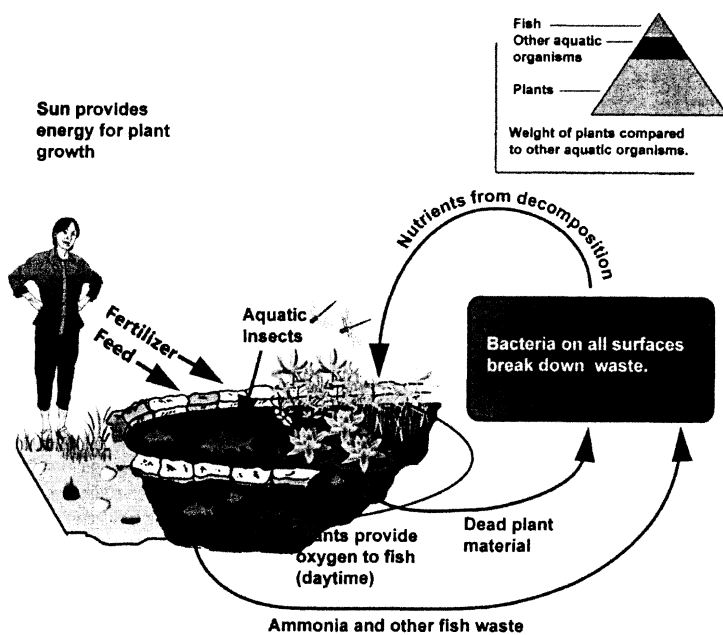


Figure 2. The correct view of a water garden ecosystem in which the knowledgeable water gardener promotes a balanced and healthy system. Excessive use of fish feed, fertilizers, and chemicals is avoided.

around the pond they are not only looking for something to eat but also a place to lay their eggs. These amazing aerial insects spend the first part of their life underwater as predators of insects and other small forms of pond life.



If you wish to prevent fish reproduction, stock a solitary sunfish to eat any eggs that are laid. Sunfish such as bluegill, green sunfish, or redear sunfish will eliminate the problem.

Learning about the lifecycles and functions of the different forms of life in your water garden and how they form an inter-related, balanced system will greatly enhance your enjoyment of it. There are many forms of plant and animal life that will find their way into your water garden. Just as bird watchers enjoy finding and observing birds, you can enjoy the many interesting forms of aquatic life in your pond. A magnifying glass is recommended.

Aquatic plants require nitrogen, phosphorous, and other nutrients, just like all other plants. The most reliable way to supply nutrients to containerized plants is to insert aquatic fertilizer tablets into the soil. Nutrients are also released into the water in the form of fish waste but may be taken up by phytoplankton before they come in contact with the roots of

containerized plants. Too much fertilizer can cause water quality problems leading to fish health problems and excess algae.

Quarantine to Prevent Problems

Serious fish parasites, including the dreaded "Ich" (*Ichthyophthirius multifiliis*), can easily find their way into your water garden when you introduce new fish, plants, or move anything from another water garden or pond.

- Hold new fish and plants in an isolated tank for at least two weeks.
- The quarantining of plants also gives you an opportunity to attempt to remove duckweed or watermeal that may be "hitchhiking" on larger plants.

If no problems become apparent after two weeks in quarantine, the fish are probably safe to transfer to the water garden. One exception is the koi herpes virus which requires at least 30 days in quarantine to detect. Use of harsh chemical dips to remove parasites is not recommended in most cases. Fish can be harmed by overuse of such chemicals.

Nets, pumps, and other equipment should be thoroughly dried and exposed to the sun or sterilized with chemicals before being transferred from another water garden into yours. Such items may carry parasites if they have been in contact with fish elsewhere.

Safety Concerns

To minimize the chances of someone being injured in or around a water garden, the following advice applies:

- Take care that toddlers do not have access to water gardens.
- Use ground fault interrupter outlets for pond pumps and lights. Unplug them before entering the pond.
- Pond liners can be extremely slippery - take steps to ensure that you do not slip. When you must enter your pond, having a buddy present is an excellent idea.

Design and Site Considerations

The advice of an experienced landscaper can be invaluable in assuring that you will be pleased with the appearance and functionality of your pond. Here are some recommendations to consider:

- Consider sites close to a patio or other seating area where the pond can be better enjoyed. The distant corner of the backyard may be a poor location.
- Access to an electrical outlet should be considered.
- Avoid sites under trees where leaf accumulation will be a problem.
- Do not build a water garden that receives runoff water from surrounding areas. This puts the pond at risk of chemicals in the runoff.

- Avoid locations close to bedrooms or else frogs may keep you awake.
- "Plant shelves" are a desirable feature for most water gardens.



Learning More

The following publication contains additional essential information required to plan, construct, manage and enjoy a successful water garden:

- Water Gardens,
SRAC publication no. 435.
This fact sheet is available online at srac.tamu.edu

Two other sources of information are also recommended:

- Your nearest water garden society. Check with your county Extension office to see if there is one in your community. Here are a few in the larger metro areas:
 - Green Country Water Garden Society,
Tulsa Garden Center, (918) 482-2327
www.gcwgs.com
 - Oklahoma Koi Society
www.oklakoi.org/forum
 - Tulsa Koi Society
(918) 834-KOI4
www.koitulsa.org

- Water Garden Society of Oklahoma,
Will Rogers Park, Oklahoma City
www.wgso.org
- Central Oklahoma Water Garden Society, Inc.,
Norman, OK and surrounding area
www.COWGSI.com

- Pond Life: Revised and Updated
(A Golden Guide from St. Martin's Press),
ISBN 1582381305.
Drawings and information on the amazing plants and animals that will find their way into your water garden.

Conclusion

The idea of not feeding water garden fish may be difficult for some people to accept. It is neither cruel nor impractical. Given proper stocking rates, an unfed water garden managed as described above, mimics a natural aquatic ecosystem and offers all the delights of other water gardens with fewer problems. Most water gardeners seek relaxation – the low intensity, no-feed approach offers just that.

You will hear different opinions about how best to plan and manage a water garden. Keep in mind the amount of time and effort needed for each method. Take advantage of the sources of information mentioned above and you will be in a much better position to pick and choose between various strategies for managing what will become an important part of your landscape.



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