

Agriculture's Role in The Landscape: Some New, Exciting Possibilities

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"Agro-Ecology" - *Agricultural production systems and designs that enhance the ecological value of farming operations to improve the health and function of natural systems and the environment.*

Premise: Any disturbance of natural systems will have a negative impact on the environment. However, it's too late to spend any time on that factor, since all of the natural systems remaining in South Florida have been impacted to some degree. Therefore, we must try and find ways to improve the functions and health of the pieces of the natural systems that we want to preserve, such as the Everglades, wildlife management areas such as Corbett and Dupuis, Lake Okeechobee, the Indian River, etc.

For the most part, once an area of land is urbanized, there aren't very many options available to offset the negative impacts. There are some good ones, such as training homeowners to fertilize their yards and better golf course management techniques, but there's no spatial solutions since the land has been permanently settled. It's only in agricultural lands that there are any significant options to mitigate, and hopefully reverse, the negative impacts of natural system disturbance that have occurred, and will occur. It has to be on agricultural lands – the natural systems must remain as close to natural as possible in order to be truly sustainable. They shouldn't be used to undo or prevent impacts on themselves from land uses on adjoining land.

Agriculture's Role

Within the agricultural areas, there are two fundamental approaches to restoring lost natural system functions; either buy the land for preservation or construction of projects that are designed to mitigate the impacts of land development on natural systems, such as the reservoirs proposed in CERP, or on the remainder of the farmland, modify the practices in agricultural production systems and farm designs in such a way that the impacts on natural systems are reversed to some extent -- any improvement, no matter how small, being a positive thing in the big picture. Either way, all of the mitigation of the impacts of urban areas on natural systems will have to take place on land that is

currently used for agriculture, since the urban land is irreversibly developed.

"*Agro-ecology*" relates to the latter of these two options -- how can farming designs and practices mitigate and reverse the impacts of natural system disturbance that have taken place as of the present time, and perhaps more importantly, the impacts that will result as continued urban settlement of the land occurs in the future? The answer would appear to have two facets.

Best Management Practices (BMP's)

The first relates to the things we can do to make agriculture have a positive environmental impact. This has been elegantly described in the various BMP program manuals, and is a fairly mature process although the ultimate impacts of BMP's have not been fully realized since the programs are mostly new. However, the thought process, strategy, and tactics of the BMP programs have been laid out very well and there's not much opportunity to improve upon them at this point in time, and they are all a work in progress so they will be improved as experience is gained.

Integration and Connection of Urban, Agriculture, and Natural Areas

The second facet is really the question we're asking in the conference. How can agricultural operations be integrated into community planning and design in order to reduce the impacts of further settlement of the land by people, which will definitely occur? Can agriculture be integrated in such a way that new urban settlements do not have any detrimental effect on the remaining natural systems? In other words, a new town is a bad thing for ecological systems if we keep building towns with the same attributes of those that have been developed in the past, for a number of reasons. Almost any kind of agricultural operation presently in South Florida is better environmentally and ecologically than a new town if stormwater is attenuated by some means, which will be provided as a retrofit under CERP and is required in the permitting process for new ag developments. With BMP's, there aren't any significant problems from pesticides, fertilizer, or other contaminants, and farms are a much more diverse biological system than a subdivision or golf course. Also, agricultural operations provide diversity to the local economies and they are net revenue producers for local governments, which lowers the cost of living for every citizen.

The problem is that the new towns, subdivisions, etc., have displaced the agriculture that preceded them, so that the remaining natural systems are forced to accept the impacts of the new settlements, which are greater than the impacts of the agriculture they replaced, especially if the ag has good BMP's in place. Also, the inherent economic, social, and ecological values of agricultural operations are permanently lost.

Therefore, the question is whether new settlement designs can include an agricultural component whose job it would be to reverse the negative impacts of the settlement itself by cleaning up water, utilizing wastes, providing increased biological diversity, providing habitat for displaced species, sequestering the carbon created by internal combustion

engines, adding oxygen back in the atmosphere, etc., as well as enhancing the social and economic diversity of communities. The local food production value would also be a nice benefit, but isn't the predominant factor since people will get food, even if there's no farming in the neighborhood.

This is all in addition to essentially the end of water competition, because the goal would be for everybody to use the same water -- first in the urban area, then the ag, then the natural system receiving body. Ag's job would be to clean up the water from the urban areas -- something that is definitely possible since there are examples of this kind of system in place at present. The goal would be to have the natural areas receive clean water with the same hydroperiods as was the case before people arrived. The water from urban areas, which include roads, industrial facilities, wastewater treatment plants, etc., can be utilized in agricultural systems readily without compromising food safety and quality, but is a detriment to natural systems unless it is treated to higher levels than is currently the case, which would result in a higher cost of living to people living in the urban communities.

Also, the inclusion of ag in the permanent landscape assures retention of open space and other positive attributes afforded by an alternative to an ocean-to-natural system boundary development pattern. BMP-based agriculture could be the spatial buffer between high-intensity urban areas and natural systems, which should result in much greater biological diversity.

How Do We Get From There from Here?

Intuitively, these kinds of integrated community designs would seem to be possible. However, there are two major obstacles that will interfere with this process. First, we don't really know exactly how to design the agricultural component of an urban settlement. Secondly, we don't know how to make it cash flow.

Until these two questions are answered, or perhaps more accurately until some of the answers to these two questions are articulated, it will just be a good idea but won't be pursued. Therefore, the fundamental thing that stands in the way of a community development process that includes an agricultural land use component is the simple lack of information.

Research - The Source of Answers

One of the most likely sources of that information is the well-established agricultural research industry. This isn't only about social science or environmental research, it's about measurable things such as the ability of a citrus grove or vegetable field to remove the nitrogen and phosphorous from municipal waste water and biosolids such that the water that leaves the field does not contain traces of those chemicals. Large-scale, real-world projects have proven that it can be done, but there has been no attempt at trying to integrate these kinds of things in community planning, mostly because people don't have sufficient information to do so with a high degree of confidence that it will work.

Without a high degree of confidence, and solid backing of the non-ag citizenry, local governments will not risk moving off of the seemingly solid ground offered by the existing land use development regulations. This backing of the general citizenry is a critical component, because all the people in the agricultural industry nationwide only make up about 3% of the total population. They'll get outvoted every time. So, it isn't up to ag to make these choices – it's up to everyone.

Why Agricultural Research?

The reason why we need the agricultural research community to do a lot of this work is because ideally, we want to convert waste and environmentally-harmful substances into agricultural products that can be removed from the system. If we don't harvest something and take it away, all of those things we're trying to eliminate will remain in the system and, sooner or later, escape into the natural areas we're trying to preserve.

By harvesting something that contains nitrogen, for example, we will be removing the nitrogen from the ecological system if it is supplied by the urban community that produced it instead of being imported and applied as fertilizer. Or perhaps more accurately, we would be recycling the nitrogen back to where it came from if we use it to grow food that people can eat.

The same is true for other things – something generated by an urban area that is a detriment to the natural system may be a requirement in an agricultural production system. Why not capture it where it can do some good instead of harm? Therefore, the agricultural research community must help farmers, and everyone else, learn how to design production systems that can utilize what is now perceived to be waste and environmental contaminants in a positive way.

Under an ecology-based scenario, the design of the production units (farms), and the practices used, must fulfill four goals -- first, trap the things from urban areas that we don't want in natural areas inside the agricultural production system; second, remove those things from the system through harvest of a crop, be it sod, vegetables, fruits, palm trees, forestry products, animals, or some other agricultural product, or sequester those things permanently in the system; third, do these things in an agricultural landscape that maximizes biological diversity, endangered species habitat, and other positive impacts for the ecology in order to enhance the viability of connected natural systems; and fourth, maintain positive cash flow for everyone as a result of these choices, making sure that land values are not devalued in any way.

The agricultural researchers will probably need to work as a team with community planners, government, and researchers from other disciplines in order to develop community footprints, farm designs, planting patterns, and production practices that accomplish these four goals.

Connecting Urban Communities, Agriculture, and Natural Areas to Achieve Functional, Sustainable Systems

Currently, the agricultural industries are basically disconnected from urban communities, and both are perceived to be harmful to natural systems. This disconnection manifests itself in a number of different ways. There are generally lines drawn on land use maps that designate where agriculture is to remain, where urban development can proceed, and where natural areas are to be preserved. Quite often, these lines are the source of conflict.

There is an assumption that urban development will displace the agriculture that is almost always the land use prior to conversion to urban, since very little urban development is allowed in functional natural systems. And, there are complex regulations associated with development and operation of agriculture and urban communities designed to minimize, rather than eliminate, the impact to natural systems. These regulations assure a minimum level of compliance, according to values developed under politically-driven processes. Often, the highest outcome is one where everyone loses the least.

The challenge is to find ways, and reasons, to *connect* urban development, natural systems, and agricultural land use components in a permanent, functional manner. There are many possibilities that will need to be studied and described in very clear terms. Solid logic, goals, and objectives are necessary for local government and citizenry to make decisions that have a high degree of certainty.

An important new concept to be explored will be the “shared ownership” of the agricultural operations. The community as a whole, and the natural areas, will have a stake in the outcome – not just the farmer. Each will be accountable to the other to achieve sustainability. The “connections” must be clearly defined.

What's the right combination of agricultural crops to accomplish these goals? How should the production systems be designed? What are the technologies necessary to calibrate and manage the operations? How should farms be laid out to maximize biological diversity as well as crop yields? This is pure agricultural research, able to be performed by the agricultural research community -- it's just aimed at a broader goal, which is to maximize the ecological benefits as well as achieving the lowest cost per unit production costs.

And, the big one, how much is it worth to the people who will settle in the community connected to the agricultural operation? This one has to be calibrated in terms of dollars - a job for the ag economics team, the social science community, developers, and local governments as well as farmers and the agricultural research community.

Cash Flow and Profits - Necessities for Everyone

Cash flow is a primary issue. Currently, local governments expend cash for waste disposal, wastewater treatment and disposal, and environmental restoration projects. Can

this cash be invested in a different way to achieve the same, or better, outcomes at a lower cost, while improving the quality of life of all residents? Can developers and builders continue to make a profit from urban conversion? Can lenders know how to finance all of these operations? Will people buy homes in a community that has an agricultural component, which will make local governing more complex?

The answer to these questions lie in learning how agricultural systems can provide some of the things a community wants and needs, and how it can function as a buffer between natural systems and urban areas. These values would need to have sufficient significance to prompt investment to supplement the cash flow from sale of agricultural products.

This is essential, because “Urban Agriculture” must have some protection from the vagaries of the global food production and distribution systems in order to remain steadily sustainable. Without this kind of protection, the risks that the system will not work will be greatly increased as global consolidation continues in the agricultural industries. Small farms, the most likely entities in the agricultural component, will cease to be a viable option unless some value-added revenue sources can be identified.

Possibilities include the use of wastewater and composted biosolids to provide nitrogen and phosphorous needs of agricultural crops, thereby reducing the cost of production of the agricultural crop and reducing both the costs of waste disposal incurred by local governments and the environmental impacts of landfills and other disposal sites. Urban plant debris can be composted and added to agricultural fields to improve organic matter, thereby sequestering some of the carbon generated by automobile exhausts, and reducing water and nutrient requirements to produce the crops. Aquaculture and other agricultural systems could produce food using low-quality water, and the water then used again for an agricultural crop that would extract any impurities. Forestry could become a local renewable resource for paper and lumber needs, or biomass could be produced for energy generation. There are many possibilities – limited only by imagination.

An important consideration is that the value of land must be maintained. If land currently has value for development, the landowner should receive that value even if the land is to be permanently designated for agriculture. This can only occur if the agricultural operation is unequivocally defined as an integral component of the community as a whole, just as if it has houses built on it. In order for this to occur, the connections between the agricultural, natural systems, and urban components must be clearly defined as different parts of a whole, and be permanently sustainable.

Opportunity Arises at the Point of Land Use Conversion

The greatest opportunity for achieving this kind of outcome is precisely at the point where land use conversion from ag to urban occurs. That is the moment that offers the most options, greatest flexibility, and available funding. It’s the moment where these kinds of concepts can be applied – there really is no other.

It's very difficult and expensive to retro-fit existing ag, urban, or natural systems. At the point where land use conversion occurs, however, there is already the assumption that significant capital expenditures in the form of land purchase, urban design, permitting, and construction will be invested. The entire landscape will be completely reorganized, redrawn, and redefined. The promise of revenue that justifies this level of effort comes from the anticipated purchase of the homes or other buildings that will be constructed. It is at this instant that the opportunity to design the permanent footprint, and operating philosophy, of a new community is possible. Reality occurs at the point of action. Each new development represents a unique point in the future of South Florida, and the permitting processes are the place where the decisions related to connectivity and sustainability must be made.

Now Is The Time to Start – Agro-Ecology Conference 2003

If we want different outcomes, we must make different choices. The choices we've been making have achieved the outcome at the present time. Apparently, judging from the cost of Everglades and other natural system restoration, ad valorem tax levels and chronic government funding shortages, challenges relating to waste disposal and water management, and economic problems in the agricultural community, it's probably not a good idea to keep doing what we're doing. The opportunity to prepare for making different choices is now – while there's still agriculture in the picture. If we wait until it's gone, as is the case in highly urbanized areas of South Florida, it will be too late. On the other hand, if we make different choices, we can collectively achieve outcomes in which everyone comes out ahead, including our natural systems that we all will have paid to acquire and restore.

Agricultural research is an important source of information we need to answer the many questions associated with this process. In that light, the agricultural research community will be an integral player in the future land use decisions of South Florida residents. It is up to the citizens of South Florida to participate in the discussions with agricultural landowners and the agricultural research community to determine priorities, directions, and acquire the funding necessary to produce the information we need to make good decisions, because the choices belong to all of us.