WEC276

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Conservation Subdivision: Design Phase – Location of Conserved Open Spaces[1]

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Introduction

Figure 1. Sandhill crane. Credits: Mark Hostetler, University of Florida, 2009

As urban communities grow, design and management strategies for new developments become critical factors that determine impacts on natural resources. How can we accommodate growth and yet conserve natural resources, such as biodiversity, water, and energy? In this document, we focus on conserving biodiversity when land is subdivided. The term biological diversity or *biodiversity* refers to the variety of life and its processes. Biodiversity includes species diversity, habitat diversity, and genetic diversity. For the purposes of this article, we focus on biodiversity of *native* species. Native species are plants and animals that were present within a specific region before Europeans made first contact. Non-native (or exotic) plants or animals are defined as those species that were not present in the region before European contact.

Recently, a popular concept called *clustered development* or *conservation subdivision* has been advanced by the landscape architecture community. Conservation subdivision is intended to integrate growth with biodiversity conservation. Conservation subdivisions typically are developments where homes are clustered on small lots with the remaining areas conserved as open space.

The concept of conservation subdivision has gained traction in many planning and design fields. The goals for conservation subdivisions are twofold: 1) to improve biodiversity within a designated a subdivision; and 2) to minimize development-related impacts on surrounding habitats. Often, though, most of the effort is on the design of the entire site. To conserve and improve biodiversity within urban

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environments effectively, one must consider the following three phases of development: **design**, **construction,** and **post-construction.**

The design phase is typically where, among other aspects, lot size and open space are designated, and roads are distributed throughout the site. Goals for the development project are discussed and prioritized. In this phase, homes and lots are placed across the site and the remaining area designated as (natural) open space. Basically, everything is laid out on paper and vertical structures (i.e. buildings) and horizontal structures (i.e. roads, lots, conserved areas, and shared spaces) are given specific spaces within the development.

Next, during the construction phase, a whole host of built environment professionals (e.g., architects, contractors, and subcontractors) take whatever is on paper and implement this on the ground, constructing homes, streets, waste treatment systems, and landscaped areas (i.e. sections and parks). In the absence of fully trained or engaged contractors or landscapers, many things can happen during this phase that could impact the viability of onsite and nearby natural habitat. For example, even if the most important large trees are preserved across the subdivision and built areas are designed around them, the placement of topsoil and routes used by heavy construction vehicles could impair the survival of these trees. If heavy vehicles continually run over the root zone of a tree or if topsoil is placed against the tree trunk, the roots may not be able to acquire nutrients, water, and oxygen and the tree may die.

In the final phase, post-construction, buyers purchase the homes, move into the community, and manage their own homes and sections, neighborhoods, and common areas. It is now the responsibility of residents to manage their homes, yards, and neighborhoods in ways that do not compromise the original intent of the community. Additional problems can arise if residents are not fully engaged – imagine residents moving in and planting invasive exotic plants in each of their yards. Residents could also improperly apply fertilizers and pesticides. The spread of invasive plants and stormwater runoff could then destroy or at least severely reduce the diversity of animals plants found in the conserved areas.

Overall, these three phases must be addressed in order to create and maintain biodiversity within residential subdivisions. A series of EDIS documents, titled "Conservation Subdivision," discuss biodiversity conservation pertaining to all three phases of development: design, construction, and post-construction. This fact sheet focuses on decisions made in the design phase. During the design phase, people will often consider what percentage of the site will be conserved as open space. This conserved open space could be located virtually anywhere on a site. This fact sheet helps one to locate open space that would maximize biodiversity values.

Analyze Your Site's Significant Natural Resources

The best development designs begin with a thorough inventory of the existing site. A variety of economic, social, and natural benefits are available to built environment professionals who incorporate the existing features of a site into their development plans. Concentrate on conserving the most significant natural resources on your development property. This effort requires the coordination of experts in a variety of disciplines. Conserving multiple resources will benefit multiple wildlife and plant species. The following surveys are useful when planning to conserve biodiversity:

- Vegetation and tree survey
- Topographical survey
- Wildlife survey
- Wetland survey
- Soil survey

These surveys will help you prioritize the most valuable areas for conservation or restoration on a parcel of land. Some areas of the property are more "pristine" and not as degraded as other areas. Degraded areas typically contain exotic plants and may have had a recent human use (e.g. cultivated pasture land) that contributed to their being of less value ecologically. Also, the size of the area and surrounding land use should be factored in when

ranking an area (see EDIS document: Conservation Subdivision: Design Phase – Patch Size and Shape of Conserved Open Spaces).

In terms of animals, does your land support high species diversity and/or contain listed species? Is the location and habitat quality suitable for supporting endangered and threatened species of wildlife that occur in the area? A good wildlife species inventory (along with vegetation inventories) will help provide information about where to locate conserved areas or areas targeted for restoration of wildlife habitat. In particular, be aware of surrounding land as areas within your site could augment nearby areas to produce effectively large patches of wildlife habitat. Similar types of survey should also apply to archaeological and cultural factors.

Focus Development Activities on Previously Disturbed Sites

There are many types of previous site disturbance. They range from managed forestry, grazing, and agricultural uses to the more permanent and disruptive urban uses. It is best to redevelop areas already altered by buildings and roads or other human land uses. Advantages include pre-existing municipal services, established transportation networks, and no net increase in fragmented wildlife habitat or impervious surfaces.

Again, an ounce of protection is worth a pound of restoration! Protecting rapidly diminishing primary habitats has to be a priority. These habitats are the benchmarks, reference points and seed sources for restoration. Patches of original native vegetation (no matter how degraded) are precious heritage and are essentially irreplaceable. Contemporary patches may be composed of remnant or restored native trees, shrubs, ferns and/or grasses, and also exotic woods, all of which can have some value as habitat or nurseries. Avoid removing such habitat at all cost. Often not much is left in lowland areas. It is always best to restore habitat around remnants (even an individual bush or fern) than to clean everything out and start from scratch.

By protecting vegetation *within your site*, you also protect both topsoil and subsoils. The properties of the upper subsoil (0.2 to 1 m depth) can be critical in supporting plants and soil biota (e.g., earthworms). When subjected to earthwork machines, soils, especially fine-textured soils, may be altered dramatically. The local soil on a given site is full of unique soil biota, including thousands of unique and beneficial bacteria and fungi. It also contains (if it has not previously been disturbed) an excellent source of local seeds and soil fauna. Retaining such healthy soils, and limiting the use of earthwork machines to protect their fragile biota, will decrease the care and maintenance required for any new vegetation planted. It sometimes takes thousands of years to form healthy soils and even removing topsoil, storing it, and returning it to the original location does not really work. It is such a disruptive process that it destroys soil structure and it will take years for the soil to return to its original state. On disturbed sites that need soil or "fill," care should be taken to only use soil from other locations within a construction site. Conserving local topsoil and reducing compaction of soil on site will eventually benefit any (future) planted vegetation.

When your development site does not include pre-existing urban infrastructure, it is better to build on abandoned pastoral or agricultural lands than on existing natural communities. Areas less affected by previous human activities should also be considered less desirable for new development.

Conserve High-quality and Rare Natural Communities

As stated earlier, biodiversity is a combination of species and genetic richness and natural community types. Each potential development property may have a number of different natural community types. Some natural communities may be of higher quality or rarer than others.

In some cases, give priority to rare natural communities. It is imperative to conserve remaining natural communities, even if they are degraded, because most of them are highly threatened. However, a range of natural community types may be established across the proposed development site, and decisions have to be made where to conserve and where to build. For example, there may be very few forest remnants left in a region and if forest is on your

site, you may want to give it priority and build on unforested portions. In many cases, it may be that most natural community types are rare in the region and it will be difficult to choose among the remnants. Each decision will be unique to your parcel of land. Additionally, quantity is not necessarily better than quality. In some situations, a high-quality though somewhat common natural community may be preferable for preservation over a low-quality, more rare community. This balance needs to be evaluated by an experienced ecologist.

High-quality natural communities tend to have a high number of indigenous species and a low disturbance history. Indigenous species (or native species) are those characteristic of or prevalent in a particular natural community. Indigenous species are very vulnerable to habitat loss because they are unable to survive in different natural communities. For example, a relatively undisturbed wetland may contain an assortment of indigenous birds, frogs, lizards, and plants. Such a high-quality wetland would be difficult to mimic if one were to fill it in and attempt to recreate the wetland in another section of the site. The wetland animals and plants would not be present in nearby, high-quality upland areas because they are not adapted to such conditions. Plus, heavily disturbed areas (e.g. ones that had a history of human activity causing fragmentation of the habitat or pollution) are at risk of invasion (or have already been invaded) by exotic species. A predominance of invasive exotics within an area disrupts the conditions necessary for indigenous species survival.

It must be noted that every parcel of land and the regional context is unique. There is no established formula for determining which communities should be conserved and which are expendable. Each proposed development should undergo a thorough review by experienced natural-area specialists. These specialists can help your development establish the most balanced land-use design and management scheme possible. In addition, several organizations and websites can provide information about major natural communities:

Landscope – http://www.landscope.org/

NatureServe - http://www.natureserve.org/

Consider Nearby Habitat and People

Each potential development property is as unique as the natural communities that exist there. As mentioned before, sometimes certain areas bordering the property are of special value and one may want to implement management plans and/or create conserved areas near habitat residing outside the site. For example, a vulnerable species (e.g. Florida Scrub Jay, *Aphelocoma coerulescens*) may be located in habitat just on one side of the property, which would warrant creating a buffer of habitat along this border and restricting access to the area. In addition, rare habitat or habitat of local interest may be found on one side, and so creating a patch of new habitat will make this area larger. In some cases, corridors may be warranted to connect natural areas that lie outside the boundaries of the property, facilitating the movement of plants and animals.

Also, pay attention to wetlands within a proposed development and surrounding wetlands. because development always affects a site's . For example, if critical wetland habitat is located on one side of the property, you may want to build most of the roads and homes away from the wetland to reduce the impact of stormwater runoff. Overall, you should not focus on just the land within the boundaries of the proposed site. Decisions made within a site can impact surrounding lands and people. Listening to the concerns of people living nearby and involving them in discussions about the proposed development can promote positive community involvement. Broadening the scope of the plan to include surrounding peoples and landscapes will ultimately help achieve goals to benefit the entire city, district, or region.

For subdivisions located near birds or other wildlife species that are sensitive to human disturbance, developers should look into creating buffers between the homes and the wildlife habitat. In many cases, specific management may be required to minimize the impacts of people. You might develop an education plan that engages residents on appropriate behaviors, or you might consider restricting access to the critical habitat during the breeding season.

Additional Resources

For additional information on conservation subdivisions and conserving urban biodiversity, a variety of online guides, books and other publications exist.

Additional Resources

Arendt, R.G., 1996. Conservation Design for Subdivisions: A Practical Guide to Creating Open Space Networks. Island Press, Washington, DC.

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Department of Wildlife Ecology and Conservation Extension: http://www.wec.ufl.edu/extension/

Florida Fish and Wildlife Conservation Commission – Planting a Refuge for Wildlife: http://myfwc.com/RECREATION/View_iybrefuge.htm

Living Green: http://www.livinggreen.ifas.ufl.edu

Program for Resource Efficient Communities: http://www.buildgreen.ufl.edu

Sustainable Site Initiative: http://www.sustainablesites.org/