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Conservation *through* COMMUNITY LEADERSHIP

Empowering community leaders to manage our shared natural resources

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CCL Toolkit

Conservation through Community Leadership

Communities are faced with many challenges and a number of these are their natural resources. Natural resources are recognized as local assets with economic, ecological, and recreational benefits. Overall, the health of natural resources affects the quality of life in a community. Some natural resource issues, like water quality and open space, have an immediate impact on individual and public health, but other concerns also take their toll. For example, insects, like the emerald ash borer, and diseases that target plants have a high economic expense and change the local landscape. On the other hand, loss of biodiversity (i.e. plant and animal species), has a longer-term ecological and economic impact that may not be readily apparent.

Working together to address natural resource issues can make your community a better place to live. Natural resource management goals may include protection, conservation, and various degrees of consumption.

A unique aspect of natural resource management is that these resources can have a variety of owners, which can create conflict. Certain natural resources are preserved for public use and are owned and maintained by the government for the public—for example wildlife and navigable lakes and rivers—but, these natural resources may reside on land that is public or privately owned. Varying goals of federal, state, and local governments, landowners, and the public create complications.

The Conservation through Community Leadership program is designed to serve as a roadmap for communities as they tackle complex land use and natural resource management challenges. The curriculum provides information, tools, and resources to assist communities in working with diverse stakeholders to:

- Identify an issue.
- Assess current community conditions and resources.
- Create a shared vison.
- Develop an action plan and implementation strategies.

Through this program, community groups identify issues of concern and choose a program track of either a) land use planning with a focus on natural resource issues or b) invasive species management. Local leads then convene a working group to meet with Purdue Extension facilitators over the course of approximately four to six meetings. Facilitators help support community visioning, share innovative management strategies, and coach action

plan development. The result is a local or regional action plan and implementation strategies for projects that may include forming invasive species management working groups, developing county or municipal comprehensive plan updates, or creating watershed management plans.

Target Audiences

The Conservation through Community Leadership program is designed for local leaders, government officials and their staff, representatives from nongovernmental organizations, and residents who want to participate in local natural resource decisions.

Format

The community action planning process includes:

- A curriculum guide and education resources to support action planning that is focused on a natural resource concern.
- A series of approximately four to six facilitated meetings that result in a local or regional action plan and strategies for implementation projects. Meetings are structured to fit each community's planning needs.

Program Objectives

Community groups participating in the action planning process will:

- Increase their understanding of assessing ecosystem health and natural resource management options.
- Apply decision-support tools to make decisions and take actions on ecosystem health.
- Form diverse community partnerships to create and implement land use and/or natural resource management action plans. These action plans may be designed to:
    - Identify and address natural resource issues in your community.
    - Form invasive species management working groups.
    - Update county or municipal comprehensive plans.
    - Support watershed management plans.
    - Implement fundraising initiatives for specific projects.

Planning Tools for Land Use and Natural Resource Management

Guiding and managing land use is integral to natural resource management. Most land use guidance is created, updated, and enforced at the county or municipal government level. In counties or municipalities that have a plan commission, comprehensive plans are the primary policy document used to guide land use decisions. This section provides an overview of the planning tools available in Indiana to manage land use and the agencies that administer land use planning.

Watershed Management Planning and the Watershed Management Planning Process

According to the Indiana Department of Environmental Management (IDEM), watershed planning is a geographic approach to addressing water quality problems within the boundaries of a specific watershed. Watershed boundaries often extend across multiple local government jurisdictions and state lines. Progress on watershed issues requires cooperation both among and between private landowners and government entities. Therefore, state agencies such as the IDEM and the Indiana Department of Natural Resources as well as federal agencies such as the U.S. Environmental Protection Agency have developed funding programs, guidance documents, and criteria for determining problems in a watershed. These agencies administer implementation funds and shape the final watershed group planning product. However, the watershed planning process depends on skills and interests that arise as a watershed group forms and the group determines where to focus its attention and defines action steps. The following is a general outline of the process Indiana watershed groups have used to develop and submit watershed management plans to IDEM.

Watershed groups can arise based on common interests or issues among community members and state or local government agencies. Once a watershed group forms and determines its geographic focus, it then conducts a watershed inventory. Using a computer, the inventory can be started by accessing online publicly available data from a variety of sources such as Google Earth and GIS platforms such as IndianaMAP.org. First, the group compiles data and identifies specific areas of interest in the watershed based on the data. For example, a group focused on erosion may identify areas of steep slope or exposed riverbanks using a combination of aerial imagery and GIS contour data. Once areas of interest are identified, a windshield survey provides additional data to use in the watershed management plan.

Next, the group conducts water quality monitoring to provide a baseline to compare with post-implementation data. Through this monitoring, the watershed group will learn whether it has been effective in addressing water quality. This step is important to confirm the existence and significance of problems that the group has chosen to focus on. Water quality monitoring can also reveal unknown issues that the group could

elect to address as well. If technical expertise is required, the group may recruit professionals. For example, it is likely a watershed group will need outside expertise in measuring water quality characteristics such as nutrient loads, pathogens, and biological sampling (IDEM, 2010).

Once the watershed has been characterized through the watershed inventory, and existing conditions have been established via the windshield survey and water quality monitoring, the watershed groups can analyze the data and identify the causes and sources of watershed problems. The group can then prioritize watershed issues and set targets for water quality improvement.

Improvements in water quality should be measured with the same metrics used to determine the existence of the problem. This way, progress towards the project goal can be measured through post-implementation sampling. Implementation actions include best management practices (BMPs) appropriate to the identified problem(s). These implementation practices form the heart of a watershed action plan. The watershed action plan lays out what the group will do to address the problems, and is included as a sub-plan in the overall management plan. Developing the action plan is important because it outlines what is to be done, when it will happen, and who is responsible. It should also outline the cost, any outside assistance or partnerships involved, milestones in the process, and products or results (IDEM, 2010).

The State of Indiana recommends the steps outlined above for developing a factually-based, practical plan that can be implemented to achieve measurable results. While watershed groups may or may not need to tailor their planning process to generate outputs that meet the requirements of a state or federal program, this process pres-

IndianaMAP.org

Indiana Dunes National Park

ents a logical, issue-driven approach that these groups can use to identify and address water quality problems in their watersheds and communities.

Comprehensive Plans

Cities, smaller communities, and counties across Indiana undertake the comprehensive planning process to establish a vision for land use and community needs. Communities that choose this path must develop plans that contain the following: 1) objectives for future development 2) a statement of policy for the land use development of the jurisdiction, and 3) a statement of policy for development of roads, public places, public lands, public structures, and public utilities. Most comprehensive plans focus on how the community will change in the next 20 years. This prevents the plan from being overly specific and provides adaptability. The list below shows some common elements of plans found in Indiana communities:

- Land use (existing and projected)
- Transportation
- Housing
- Natural resources and open space
- Demographics
- Utilities and public services

Land use planning is integral to the comprehensive plan and natural resource management. Most land use planning occurs at the municipal or county level through the comprehensive planning process. The comprehensive planning process is led by plan commissioners or their staff or through a contracted planning consultancy. At minimum, one public hearing is required before the plan is approved by the plan commission. However, a high-quality public input process is critical to receiving buy-in on the plan's policies, goals, and strategies from the public and elected officials. Often, plan commission staff members or a consultant conducts a series of open houses or focus group feedback sessions. Each meeting may focus on a certain element of the comprehensive plan. Though none of these efforts are required in Indiana, they are part of a public engagement strategy that supports comprehensive plan development. Through this process, communities are able to take account of their natural resources and consider how to manage, develop, and conserve them in the best interest of residents and businesses. This process allows the plan commission to develop a plan that reflects community values, interests, and concerns.

The jurisdiction's legislative body must approve the plan via resolution for it to become an official policy document. Comprehensive plans are the primary policy document adopted by local government to guide land use decisions.

Land use planning for natural resources includes doing an inventory of the municipality or county's existing natural resources and developing land use policies, goals, and objectives. The inventory, such as maps, text, and tables that describe existing conditions, is often included as an independent element of the comprehensive plan. In addition, natural resources can be addressed, in part, by other elements of the comprehensive plan, such as land use or recreation. This information forms the foundation for land use policy that can

reduce the impact of development on the community's natural resources.

Monroe County provides a prime example. Its comprehensive plan includes an inventory of natural resources and characteristics including Karst areas[1], wetlands, soils, floodplains, waterbodies, watersheds, contiguous forest canopy, steep slopes, and endangered series of environmental conservation goals and strategies. One strategy is to establish riparian buffers on both sides of perennial or intermittent streams. Chapter 825 of the Monroe County zoning ordinance, titled Environmental Constraints Overlay Zone, states that "riparian buffer zones, measured from the stream/vegetation interface line, shall be established to a distance of 100 feet from each side of all intermittent and perennial streams" (Monroe County, Indiana, 2008). This is a clear example of a natural resource inventory linked to policy that affects land use.

Another important aspect of the comprehensive plan is that it lays out the community's needs for capital projects, such as providing water and sewer service. Typically, Indiana communities develop Capital Improvement Programs (CIPs) that are approved by the jurisdiction's legislative body. These programs prioritize infrastructure investments and should align with the comprehensive plan's policies for land use and future development. Often, public investments in infrastructure have more impact on the form and location of development than land use regulations (Kelly and Becker, 2000). Due to their significant and long-lasting impact, it is critical that decisions regarding CIP projects consider natural resource assets within the community.

[1]Karst areas are areas where water infiltrates into the ground rapidly due to subsurface cavities in limestone bedrock. This has implications for groundwater quality and surface soil stability.

Zoning Ordinance/Subdivision Control Ordinance

Zoning ordinances and subdivision control ordinances are two tools used by Indiana local governments to regulate land use for public objectives. Zoning has been accepted as a legal exercise of government police power since the Supreme Court upheld its constitutionality in the 1926 Euclid v. Ambler Realty Company decision. Later, the Standard State Zoning Enabling Act was passed, which expanded the option to use zoning to all states. Together, zoning ordinances and subdivision control ordinances establish definitions, regulations, and procedures for how land may be divided and its purposes. Zoning classifications and restrictions are the product of each community's public planning process and differ between planning jurisdictions, but must all have a rational connection to a legitimate public purpose (typically related to protecting the health, safety, welfare, and morals of the community). Throughout the history of zoning implementation, separation of land use—and particularly the separation of conflicting land uses—has been standard practice. Residential, commercial, and industrial uses are separated geographically. The zoning ordinance also regulates density, bulk, parking, signage, landscaping requirements, and home-based businesses (Higginbotham, 2017).

Zoning ordinances may require a broad range of BMPs for conservation, such as permeable pavers, bicycle parking, green space, and impervious surface maximums. The plan commission can decide to develop and recommend the adoption of a zoning ordinance that implements best practice for conservation. This is by no means a simple process, as the commission has many stakeholders throughout the community.

A plan commission that has developed a plan with robust public engagement will be able to demonstrate that the plan represents the community's vision,

1926 Euclid v. Ambler Realty

Zoning ordinances regulate land use for public objectives

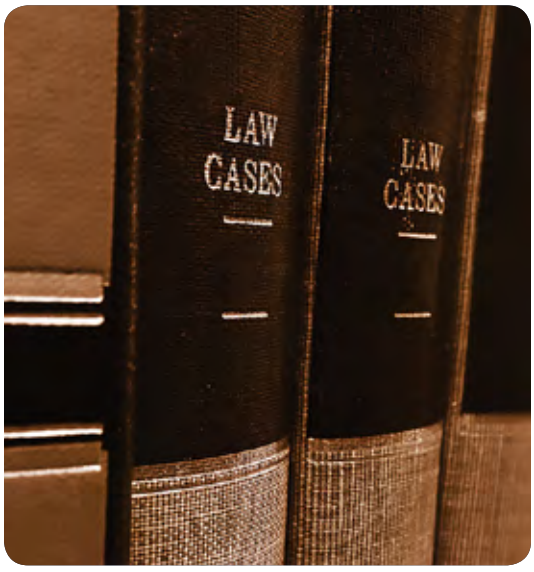
rather than the vision of any number of its members. A plan commission may also develop an ordinance that attempts to balance the environmental impact of development with the financial impact to developers.
The following are examples of zoning tools that can be used to reduce the environmental impact of development:

1. **Performance Zoning** – This type of zoning regulates characteristics of use, rather than use itself. Criteria for performance can include trip generation, odor, surface water runoff, hours of operation, and noise generation. As a result, a wider variety of land uses can occur, as long as the use meets specific performance criteria (Ottensmann, 2000).

2. **Mixed-Use Zoning** – Mixed-use zoning enables higher-density, multi-level commercial or residential development in urban areas where it is identified as desirable. Mixed-use zones are focused on integrating residential and office or retail uses, although in some cases light industrial uses are considered compatible (Atlanta Regional Commission, n.d.). A reduction in environmental impact occurs when density in already-developed areas is increased. Vehicular travel is reduced as distances between commercial and residential use are shortened.

3. **Overlay Districts** – Overlay districts protect natural resources by applying land use regulations in addition to existing regulations that are in the base classification of the zoning ordinance. For example, the City of Richmond has established an Aquifer Protection Overlay District to prevent contamination by restricting land uses that negatively affect ground water quality. Porter County has also used overlay districts in its comprehensive plan to protect its water resources. The county instituted overlay districts divided into different zones according to distance from a stream or waterbody (Thompson, 2013).

In Indiana, the plan commission is responsible for approving subdivisions. The Subdivision Control Ordinance regulates the division of land and sets standards for physical development of infrastructure and buildings. The ordinance can also include requirements for recreation facilities, conservation of naturally-sensitive lands, and landscaping (Luzier, Isaacs, and Schweitzer, 2017). The Subdivision Control Ordinance is used by the plan commission staff during the subdivision review process to recommend the approval or denial of subdivision applications to the plan commission. One



purpose of the Tippecanoe County Unified Subdivision ordinance is natural resource preservation and protection. It states the following as purposes of the ordinance:

(10) To prevent the pollution of air, streams, and ponds, to assure the adequacy of drainage facilities, to safeguard the water table, and to encourage the wise use and management of natural resources throughout the participating jurisdictions in order to preserve the integrity, stability, and beauty of the community and the value of the land.

(11) To preserve the natural beauty and topography of the participating jurisdictions and to insure appropriate development with regard to these natural features.

Other Tools and Strategies for Natural Resource Management through Land Use

1. **Conservation Easement** – A conservation easement is "[a] policy… to preserve lands indefinitely, not only for recreation, maintenance of wildlife, and scenic value, but also for maintenance of agriculture and of a way of life" (Harrison & Richardson, n.d.).

2. **Transfer of Development Rights** – This program establishes a base density and allows some landowners to transfer their development rights to other areas, thus compensating them for agreeing not to develop their land. Conservation can be achieved through the designation of these donor areas. Properties that receive additional development rights may be developed at densities greater than would otherwise be allowed. Donor land may not be developed after development right transfer occurs (Higginbotham 2017).

3. **Purchase of Development Rights** – Communities establish this program to preserve naturally sensitive areas and forbid development. The value of the right to develop land is appraised and purchased, and then the land is placed in a conservation easement (Higginbotham, 2017).

4. **Conservation Subdivision Ordinance** – Development takes place using subdivision cluster, suburban-style dwellings to preserve open spaces and natural features such as topography, water features, or other significant natural features of a site. Open spaces are never developed and are maintained by a homeowners' association (Luzier, Isaacs, and Schweitzer, 2017). According to the Hendricks County zoning ordinance, key purposes for planning for this type of subdivision are to encourage efficient use of land, preserve habitat, and to minimize the street and utility network. (Hendricks County, et al., 2008) See the resources section for example documents and handbooks for conservation subdivisions.

5. **Stormwater Management/Control Ordinance** – The stormwater management ordinance regulates how stormwater is treated in a jurisdiction. It describes required practices at construction sites to reduce sediment runoff.

6. **Riparian and Wetland Setbacks** – Riparian setbacks or buffers are zones of vegetation that allow sediment and other waterborne pollutants to settle or filter out before reaching a stream or other waterbody. They can also serve to moderate water temperature and provide additional species habitat. Setbacks can be required via the zoning ordinance or adopted by individual landowners (Castelle, Johnson, and Connolly, 1994).

Land Use Planning Agencies

Area and Advisory Plan Commissions

Of the 85 Indiana counties with plan commissions, all but three are either an area plan commission or an advisory plan commission (NIRPC, 2007). The main function of both commission types is to adopt the comprehensive plan, zoning ordinance, and subdivision control ordinance. Plan commissions also make recommendations to legislative bodies on land use issues including annexation, text amendments to the zoning ordinance or subdivision control ordinance, and changes to the zoning map. Plan commissions also approve development plans and subdivisions (Reitz and Ternet, 2017).

The two committee types differ in that area plan commissions serve a county and at least one other jurisdiction in that county, whereas advisory plan commissions serve either a county or a municipality. Also, unlike area plan commissions, an advisory plan commission serving a municipality can plan for an area up to two miles outside its corporate boundary (Reitz and Ternet, 2017). Plan commissions also

Tippecanoe County Courthouse

differ in membership composition. They are composed of appointed local officials and residents. Some officials serve in an ex oficio capacity, such as a county council person or commissioner, while residents are appointed because they own property or are in a relevant location. The exact membership requirements for area and advisory plan commissions can be found in IC 36-7-4-207.

City Council/County Commissioners

In Indiana, city councils or county commissioners are responsible for adopting the comprehensive plan and regulatory tools to implement it. These bodies should refer to the comprehensive plan for guidance when making decisions. Local legislative officials consider issues including zoning, infrastructure, annexation, and funding capital projects in the community.

Board of Zoning Appeals

The Board of Zoning Appeals (BZA) is a quasi-judicial body that can grant zoning variances or special exceptions to petitioners. While zoning is an effective tool for land use management, it cannot strictly address all circumstances without becoming cumbersome to administer, enforce, or comply with. Variances and special exceptions are a relief valve for landowners that are caused what is termed impractical difficulty in use of their property by the application of the zoning ordinance. A variance allows a landowner to circumvent certain requirements of the zoning ordinance. Special exceptions are uses permitted in the zoning ordinance only if the application meets clearly defined conditions of the ordinance. The BZA's job is to judge the facts of each case and determine whether granting a variance or special exception is justified.

State and Regional Resources for Land Use, Conservation, and Policy

Indiana Department of Natural Resources – This agency is host to a number of programs focused on conservation such as the Forest Legacy Program. For more information, visit https://www.in.gov/dnr/.

Indiana Department of Environmental Management – The Indiana Storm Water Quality Manual is available at https://www.in.gov/idem/stormwater/. The Watershed Planning Guide is available at https://www.in.gov/idem/nps/.

Indiana Land Resources Council – The council assists local and state decision makers with land use tools and policies. It is composed of public officials as well as experts in land development, the environment, and agriculture. Information from the Indiana Land Resources Council, including model ordinances and other planning guidance, is available at https://www.in.gov/isda/2357.htm.

Indiana Chapter of the American Planning Association – The state chapter holds an annual meeting and serves as a resource for citizens and practicing planners alike. Various workshops and inter-state chapter meetings are held throughout the year, mainly targeted at practicing public, private, academic, or non-profit planners. The Indiana Chapter of the APA's website can be found at http://www.indianaplanning.org/.

Indiana Citizen Planner Guide – The Indiana Citizen Planner Guide provides information on the planning process in a concise format for reference. The guide is available at http://www.indianaplanning.org/professional-development/citizen-planner-manual/.

Ball State University College of Architecture and Planning – Ball State is Indiana's only university offering nationally accredited bachelor's and master's programs in urban and regional planning. Faculty often teach studio courses and seek community partners for design charrettes and other projects. More information on the College of Architecture and Planning is available at https://www.bsu.edu/academics/collegesanddepartments/cap.

Purdue University Land Use Team – The Purdue University Land Use Team provides research-based resources and educational programs for Extension professionals, government officials, and residents on land use issues that impact their communities. Land Use Team efforts are underpinned by a timely and rigorous professional development system that prepares Purdue Extension professionals to effectively serve on plan commissions. The Purdue University Land Use Team's website has additional resources and a listing of current Land Use Team members; it can be found at https://www.cdext.purdue.edu/collaborative-projects/land-use/.

Purdue University Extension – Purdue Extension educators and specialists work to provide training and education in all 92 Indiana counties. Purdue Extension offers signature programs in agriculture, community development, the environment, youth, and family. Find more information about Extension at https://extension.purdue.edu/.

Accelerating Indiana Municipalities – This state-wide non-profit organization serves as a knowledge exchange for more than 460 Indiana municipalities and is recognized as "the official voice of municipal government in Indiana." More information is available at https://aimindiana.org/.

Indiana Office of Community and Rural Affairs – Indiana Office of Community and Rural Affairs (OCRA) offers numerous programs and provides funding that assists communities in efforts—including but not limited to—planning, disaster recovery, land use studies, historic preservation, and stormwater management. Since 2014, OCRA has collaborated with Purdue University and Ball State University in the Hometown Collaboration Initiative. This initiative is focused on developing leadership, economic development, and place making. Explore OCRA's website at https://www.in.gov/ocra/.

Indiana University Public Policy Institute – The IU Public Policy Institute provides a wide variety of analysis and services relating to demographics, land use, development, GIS, economic modeling, and surveys. It also generates publications on Indiana planning issues. The institute's website can be found at https://policyinstitute.iu.edu/.

The Nature Conservancy – The Nature Conservancy works throughout Indiana to shape policy, restore lands, and protect water. The Nature Conservancy's Indiana website can be found at https://www.nature.org/en-us/about-us/where-we-work/united-states/indiana/.

Best Management Practices Stormwater Management Manual for Southern Indiana – You can find this resource at http://www.madison-in.gov/DocumentCenter/View/27.

Additional Resources

Richmond, Indiana's Aquifer Protection Overlay District: https://www.richmondindiana.gov/docs/aquifer-protection-overlay.

A comprehensive list of Indiana state and regional land trusts and conservation organization land trusts: https://www.findalandtrust.org/states/indiana18.

North Carolina State University Conservation Subdivision Handbook: https://content.ces.ncsu.edu/conservation-subdivision-handbook.

Hoosier Environmental Council: https://www.hecweb.org/.

Indiana Wildlife Federation: https://www.indianawildlife.org/.

Indiana Conservation Alliance: http://www.inconservation.org/.

Conservation Easement/Purchase of Conservation Easement (Purchase of Development Rights) – Laporte County Comprehensive Plan: http://www.laportecounty.org/Resources/Planner/LaPorteCountyLandDevPlan.pdf.

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Emerald ash borer, Agrilus planipennis

Dan O'Keefe, Michigan Sea Grant

Silver carp, Hypophthalmichthys molitrix

Warner Park Nature Center , Warner Park Nature Center, Bugwood.org

Asian bush honeysuckle, Lonicera maackii, L. tatarica, L. morrowii, L. X bella

Natural Resource Management: Invasive Species Education and Management

Invasive species present significant ecologic, economic, and in some cases health-related challenges to urban and rural communities. Landowners and communities require appropriate tools and resources to identify, report, and manage existing invasive species problems and prevent additional infestations in the future.

This section will assist stakeholders in addressing natural resource management issues using the community development framework for visioning and action planning with a focus on invasive species. Through this program, we will enable participants to recognize and manage terrestrial plant invasive species locally, understand negative impacts of invasive species, engage invasive species management stakeholders, and create a community action plan to respond to the issue.

What Are Invasive Species?

Invasive species are plants, animals, or pathogens that are non-native (or alien) to the local ecosystem and whose introduction causes or is likely to cause harm (National Invasive Species Information Center).

Examples of invasive species that are affecting Indiana include: emerald ash borer, an invasive insect that is killing ash trees;

Asian carp, an invasive fish that forces out native fish in rivers and lakes; and Asian bush honeysuckle, an invasive terrestrial plant that invades natural areas and prevents native plants from growing.

Framing the Issue: Impact on the Community and People

Economics

The annual cost of terrestrial invasive plants alone to the United States economy is estimated at $15 billion a year. Invasive species are a global problem with the annual cost of impacts and control efforts equal to 5 percent of the world's economy. A 2012 informal survey conducted by the Indiana Invasive Plant Advisory Committee found that landowners and managers in Indiana spent $5.85 million to manage terrestrial invasive plants (Invasive Plant Advisory Committee, 2013).

Aquatic invasive species can also be very expensive or impossible to control and the resulting damage to sport fisheries, recreation, and commercial resources can be serious. Lake residents in Indiana spend an estimated $800,000 per year on public waters to chemically control Eurasian watermilfoil, an invasive water plant that can shade out native species and interfere with boating and fishing (Indiana Department of Natural Resources Division of Entomology and Plant Pathology, 2018). In the United States as a whole, an estimated total of more than $800 million is spent on the damages and control costs of aquatic weed species (Pimentel, 2005).

These are just a few examples of the costs of monitoring, control, and management

Leslie J. Mehrhoff, University of Connecticut, Bugwood.org

Fanwort, Cabomba caroliniana

Jörg Hempel https://www.flickr.com/photos/joerghempel

Yellow iris, Iris pseudacorus

Amy Benson, U.S. Geological Survey, Bugwood.org

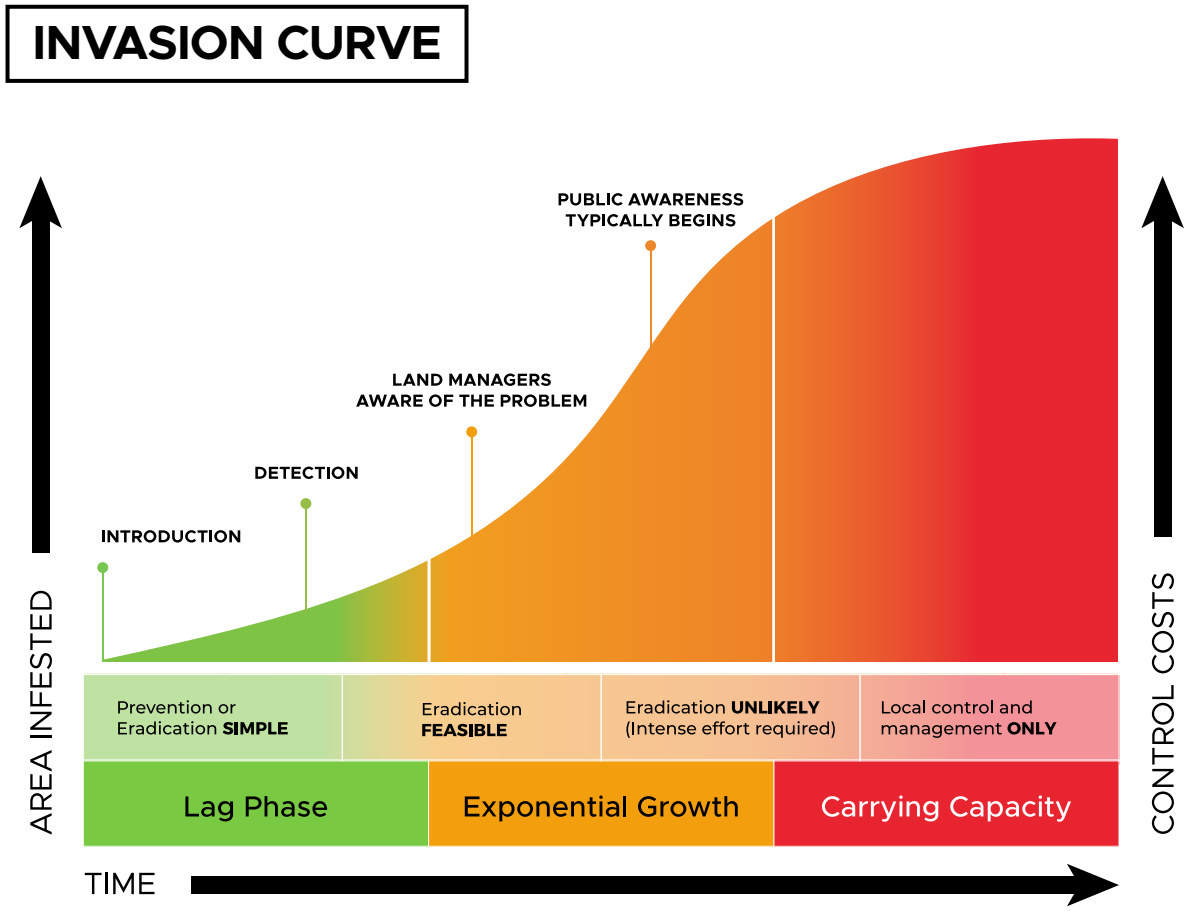
Eurasian watermilfoil, Myriophyllum spicatum

of invasive species. Because no one agency has jurisdiction over the many species and types of invasions, economic costs are difficult to determine.

What are Impacts on the Community?

The impacts on communities depend on the species and extent of invasive plants present and the areas they infest or threaten. As the extent and density of invaded areas increase, the costs of lost values and benefits to the community and the costs of control and site restoration can increase greatly (Figure 1). By detecting or controlling invasive species before they take over large areas or reach high densities, communities can maintain the quality of the land at a much lower cost, both in effort and dollars.

Figure 1.



The goal is to detect and become aware of invasive species during the early (green and orange) stages while eradication is still feasible. Without coordinated effort, awareness generally occurs later in the invasion when eradication is difficult and costly (Source: Southwest Montana Science Partnership's Module on Plants and Pollinators).

Relevance to Economic Development

Natural areas support a strong tourism and recreation industry as well as productive agriculture and forestry industries. Water resources are critical to our municipal and rural water supplies and to the tourism industry. Invasive species impact the quality of these natural resources and our economy. High quality natural resources create a higher quality of life for residents and can lead to increased economic development.

Environmental and Ecological Impacts

One of the single largest threats to our nation's natural resources, invasive species can:

1. **Reduce agricultural production and property values** – A study by the Department of Plant Biology at Ohio University found that in woodlands with an understory dominated by bush honeysuckle, hardwood tree annual volume growth was reduced up to 53 percent, with a subsequent reduction in timber sale value and income (Hartman, 2005). Agricultural losses may occur from invasive insects and weeds, reducing crop yields or increasing expenses from control of weeds and pests. According to the U.S. Forest Service, the invasive kudzu vine has overrun more than 200,000 acres and is increasing by about 2,500 acres per year (Finch, 2015). Kudzu is also an alternate host for soybean rust, leading to potential agricultural losses.

2. **Displace native plants that wildlife and fish depend on for food** – Critical pollinators and other native insects are also impacted by a reduction in native plants.

3. **Further risk endangered and threatened wildlife species** – Invasive species are the second leading cause of animal population decline and extinction worldwide. More than 400 of the over 1,300 species currently protected under the Endangered Species Act, and more than 180 species that are candidates for the list, are considered to be at risk at least partly due to displacement by, competition with, and predation by invasive species (US Fish & Wildlife Service, 2012).

Human Health Impacts

Toxic invasive plants like giant hogweed and poison hemlock present a threat of dermal and oral toxicity to those entering infested areas.

Evidence is building that the presence of invasive plant species may be raising the risks of tick-borne disease transmission to humans. Research reported in the Proceedings of the National Academy of Sciences shows that the presence of bush honeysuckle increases the density of nymph life-stage ticks infected with bacteria that cause human disease, ten times higher in areas infested with bush honeysuckle than areas without honeysuckle (Allan, 2010). A study published in the journal Environmental Entomology in 2009 revealed that higher black-legged tick (deer tick) populations correspond with greater abundance of dense Japanese barberry patches. The study concludes that managing Japanese barberry will effectively

reduce the number of deer ticks that commonly feed on humans and carry Lyme disease (Williams, 2009).

Recreation and Lifestyle Impacts

Changes in vegetation cover due to invasive plant species can decrease the aesthetic qualities of landscapes, which may have impacts on tourism. Invasive plant species can also lessen the enjoyment of recreational activities. Unmanaged and unchecked plant invasions can inhibit access for hiking or horseback riding, limit access to hunting lands, reduce wildlife populations, and can eliminate viewscapes. Invasive aquatic species can also limit swimming and watersports opportunities and harm water quality. Invasive species in the Great Lakes have reduced commercial fishing from 13–33 percent, depending on the lake, decreased sport fishing 11–35 percent, and reduced wildlife watching 0.8 percent (Lodge, 2008).

James H. Miller, USDA Forest Service, Bugwood.org

Burning bush, Euonymus alatus

Defining the problem in a community: Where is it coming from?

Invasive Terrestrial Plants

Invasive plants can come from a variety of pathways, but several of our most problematic plant species have been intentionally planted for landscaping or for conservation purposes, including controlling erosion or providing wildlife habitat. Once the plants are established and producing seed, they may spread into native forests, wildlife habitats, and parks, or disturbed sites like ditch banks, abandoned lots, and roadsides. Many invasive plants are still planted for landscaping (burning bush and Callery pear are examples) and continue to spread as they produce seed or expand as a colony of plants.

Some plants have been accidentally introduced when seed is present in packing materials, soil or gravel fill, feed, or other items that could contain plant seeds or parts. Evidence is mounting that growing deer populations may also facilitate the expansion of invasive species. White-tailed deer may over browse their habitats and this disturbance can create space for invasive species to invade and spread.

As they mature and spread seed, invasive populations can grow quickly and spread to new areas. Birds and other wildlife can spread seed long distances, as can wind and water. People may also unwittingly spread invasive plants by moving seeds or plants in soil, shoes, tools, equipment like mowers and excavators, debris, vehicles, and boats.

Aquatic Invasive Species

Aquatic invasive species may include aquatic plants like hydrilla that grow and choke waterways, or aquatic animals like zebra mussels, which attach to water supply systems and power plants. Aquatic invasive species may be introduced intentionally, such as by people dumping their aquariums in a lake, or accidentally, when organisms are transferred in ballast water or are attached to boats or other recreational equipment.

Invasive Animals, Insects, and Diseases

Invasive animals, insects, and diseases generally result from humans causing an accidental introduction, release, or spread of that species beyond its native range. Due to their potentially massive economic and health impacts, these species are generally monitored and controlled under the jurisdiction of federal and state agencies, including the U.S. Department of Agriculture Animal and Plant Health Inspection Services, U.S. Fish and Wildlife Service, Indiana Board of Animal Health, and Indiana Department of Natural Resources Division of Entomology and Plant Pathology.

Benefits and Challenges of Addressing Invasive Species

Invasive plants commonly colonize edge areas, unmaintained land, or disturbed sites. Awareness and inventory of invasive plants in public and private landscaping, parks, streets and roadsides, and natural areas can help communities prioritize the work of managing their impacts. Detecting and controlling invasive species before they cover large areas or reach high densities provides an opportunity to maintain land in good condition at a much lower cost of money and effort. Information sources and tools for identifying and reporting invasive species are provided in the Additional Resources section.

Being aware of the presence of invasive species and the means by which they spread can help slow or stop their spread. Halting the planting of known invasive plants and replacing existing invasive landscaping with native or non-invasive plants can yield greater success in efforts to control the damage invasive plants cause.

Resources to monitor, report, and control invasive species are in high demand and funding is not readily available. Public and private landowners must recognize the problem and prioritize resources for invasive species. Another challenge is recognizing and responding to an invasion before control costs become prohibitive. Invasions are often not recognized until the population has exploded and control is much more difficult.

Taking action on invasive species may also be challenging because it often involves a change in behavior and priorities. Switching from known invasive landscaping plants to native or non-invasive plants can be a good starting point to limit future infestation sources.

Finally, invasions don't recognize boundaries and can easily spread and inhabit space across the entire landscape. No one jurisdiction or landowner has the ability to manage invasions across the landscape—management requires cooperation among

all levels of government and all land ownerships, both public and private.

Tactical Approaches

Mapping and Identification: What species are present and how bad is it?

Awareness and inventory of invasive plants in public and private landscaping, parks, streets and roadsides, wooded areas, wildlife habitats, and unmaintained areas can help communities prioritize the work of managing their impacts. Invasive plants commonly colonize edge areas, unmaintained land, or disturbed sites. As they mature and spread seed, populations in these areas can grow quickly and spread to new areas. Birds and other wildlife can spread seeds long distances, as can wind and water. Information sources and tools for identification and reporting of invasive species are provided in the Additional Resources section. Often, the most valuable tool for identifying invasive species problems is awareness on the part of officials and citizenry, and a mechanism to report issues.

Several tools are available to assist citizens and communities in reporting and mapping invasive species. The Report IN and EddMaps programs provide resources for identifying, reporting, and mapping invasive species. These and additional local, regional, and national programs are listed in the Additional Resources section.

Through these resources, community members and groups who may work in, monitor, or use sites where invasive species could be present, can help track the presence and intensity of invasive species infestations. Communities can help plan for control measures by including an invasive species assessment as part of the data collection for infrastructure management.

Prioritizing Efforts

An area infested by invasive species may be so large that it is necessary to prioritize where to start. Some guiding principles can be helpful in selecting where to concentrate early efforts. Scouting for and controlling invasive plants very early in the infestation cycle results in much lower control costs, much less environmental disturbance and damage, and the possibility of eradicating the invasive plant in that location. This is termed early detection and rapid response. When invasive plants have been identified, timely reporting to people who work in or use the areas of interest can help with early detection. This needs to be followed by a rapid response to control the detected invasion before the plants begin to spread by seed or sprouts.

If the invasive plants are already well established, eradication is often not possible, but plant spread can be slowed by first controlling those plants that are producing seed. Areas that have been lightly infested should also be prioritized for early control work. Less environmental damage has been done to these sites, and more area can be cleared of invasive plants with less effort.

Several other criteria may also influence where work should start, like public safety, accessibility, unique site characteristics, rare or endangered species that are threatened by invasive plants, laws or regulations limiting activities, and funding and logistic limitations.

Control Methods

Planning and Implementation

Controlling invasive plant species involves several steps:

1. **Scouting and doing an inventory** to establish the invasive plant species present, how much area is impacted, the characteristics of the infested areas, and if possible, the sources of the infestation.

2. **Prioritizing and scheduling the locations** and types of plant control work to do.

3. **Contacting contractors** to schedule control work, or outlining and gathering the equipment, materials, and personnel needed to do the work.

4. **Doing the work** on a seasonal timeline that will provide the best results.

5. **Revisiting the treated sites** to evaluate treatment effectiveness and applying follow-up treatments—controlling invasive plants generally requires repeated treatments to the same area to kill existing plants and new plants emerging from seeds or sprouts.

6. **Monitoring control sites** to occasionally treat any invasive plants establishing in the area.

7. **In some cases, planting native or other desirable plant species** may restore invasive species treatment areas.

Using Herbicides

Herbicides are an important part of an efficient and effective program for invasive species control. An in-depth understanding of herbicide characteristics, application techniques, personal and environmental safety considerations, site conditions, and target plant characteristics is needed to

safely and effectively apply these materials. You should read the herbicide label to determine legal application methods and rates, required personal protective equipment, and appropriate target species and site conditions for applications.

For best practices when using herbicides, you can also refer to some previously mentioned sources for identifying and controlling particular invasive species. Many herbicides used for invasive plant species control are available from local garden and farm supply stores, or may be ordered from agriculture herbicide dealers.

If you are not familiar with herbicide applications in natural areas, it is important to consult with people who have training and experience with similar applications. Some examples include public and private land managers, natural resource contractors (such as foresters and restoration specialists), commercial herbicide applicators, and Extension educators or specialists. To promote safety and effectiveness, consider hiring natural resource professionals with herbicide training and experience in controlling invasive species.

Prevention

Best Management Practices

The Invasive Plant Advisory Committee of the Indiana Invasive Species Council has developed best management practices (BMPs) to prevent the introduction and spread of invasive species. See Additional Resources section for a list of BMPs.

Green Industry Collaboration

It is a good idea to work with local landscaping and nursery businesses to inform

them about this topic, including invasive plants that are still in trade and native or non-invasive alternatives for customers looking for landscaping plants. Some of these businesses may also be well positioned to assist with removing invasive species and restoring desirable plants. A statewide voluntary certification program, Grow Indiana Natives, has been developed to encourage the nursery industry to sell native plants.

Local Organizations that Address Invasive Species

Developing a local organization to address invasive species may be a successful approach for communities to consider. These groups, commonly known as Cooperative Invasive Species Management Areas (CISMAs) or Cooperative Weed Management Areas (CWMAs) organize community members, public lands agencies, and private landowners to prevent, control, and educate with the goal of reducing invasive species impacts locally.

Watershed groups and county Soil and Water Conservation Districts (SWCDs) also address invasive species as part of their mission to improve the environment. Grant programs and resources exist to assist the startup of local groups. Southern Indiana Cooperative Invasive Management (SICIM) is working to develop local groups in all counties across Indiana. The U.S. Department of Agriculture has been an important source of funding for invasive plant species control through cost-sharing conservation programs like the Environmental Quality Incentives Program (EQIP) and special project grants.

Public Education

An important part of an invasive control program is to raise awareness of steps that residents can take to help prevent their establishment and spread. Education field days and other events (including community events like festivals, fairs, and Arbor or Earth Day celebrations), signage and boot cleaning stations at public parks and natural areas, direct mailings, and articles and interviews in local and regional media may all provide opportunities to raise public awareness about invasive species. Education efforts can also engage youth or community service groups.

Regulatory Approaches

Federal Laws

Federal invasive species laws are limited and are generally related to organisms that have the potential to have substantial economic impacts on agriculture or devastating impacts on the ecosystem. A list of federal laws is available in the Additional Resources section.

State Rules and Statutes

Indiana has few regulations and limited ability to further regulate invasive species at this time. The state lists Canada thistle, purple loosestrife, multiflora rose, bur cucumber, Columbus grass, shattercane, and johnsongrass as noxious weeds and subject to state law. In state code (IC 14-24-12), these plants are specifically prohibited from sale, planting, and distribution. Note that existing plants are not regulated under this statute. A list of all state laws related to

invasive species is located in the Additional Resources section.

The Indiana Natural Resources Commission establishes standards for declaration and control of pests and pathogens and regulation of nurseries. The Indiana Division of Entomology and Plant Pathology director has the authority to implement and carry out these rules.

The Indiana Invasive Species Council (IISC) was created with several roles, one of which is to make recommendations regarding invasive species to government agencies and legislative committees (IC 15-16-10). The council has no regulatory authority but has begun exploring potential statutes or rules to regulate invasive species.

The IISC is exploring a new rule that would prohibit five invasive terrestrial plants in the state. Prohibited plants could be monitored, inspected, and removed per the rule. Thirty-nine additional plants would be designated as restricted, preventing sale or distribution. The proposed rule, which is slated for consideration in 2019, provides no legal means of controlling existing plants on the restricted list.

Marshall County Courthouse

Another Indiana statute regulates the possession or distribution of aquatic invasive animals and plants. See the Additional Resources section for a complete list of the prohibited aquatic invasives.

Local Regulation and Ordinances

Local jurisdictions can manage plant pests through a weed control board, whose operation is in statute (IC 16-16-7). Unfortunately, at this time, only five noxious weeds are under control of local weed boards, none of which is considered an invasive woodland plant. In other states, local weed control boards are used to regulate a number of invasive plants that have been determined through state statute. This is an area that could be explored for creating regulations at the local level, but would require state legislation.

Should a community wish to pursue opportunities for regulating invasive species, it is important to seek guidance from IISC or the director of the Division of Entomology and Plant Pathology. Any new regulation would require either a rule approved by the Natural Resources Commission or a new statute approved by the state legislature. Since regulations are not widely used to address invasive species, prevention and monitoring programs are a commonly used approach to reducing invasive species impacts.

Local Policies to Address Invasive Species

Planting Guidelines

Communities can develop planting guides for public property to discourage the use of invasive landscape plants and encourage the use of native plants. This guide can provide an example to private landowners. Some communities have adopted local guidelines or ordinances covering the planting and care of trees and shrubs, particularly on, but not necessarily limited to, public lands. These documents should include lists of invasive species to avoid in plantings.

Promoting native plants and pollinators can be a positive program for the community. The City of South Bend created a document titled "Trees Suitable for Planting in South Bend City Limits."

In this list, 56.9 percent of the trees that are considered suitable for planting are not native to North America. Only 12.1 percent are true native trees (in green in the pie chart below), which should be the goal of any planting program. This problem is not endemic to South Bend or even to Indiana, but is an example of the lack of knowledge about invasive species, and illustrates that care must be taken when developing planting guidelines.

Summary of "Street Tree MASTER PLANTING LIST 2017," City of South Bend, IN

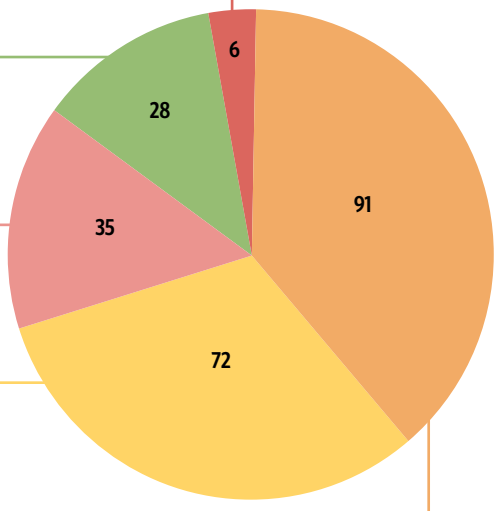
2.6%
Exotic trees that are officially listed as invasive by the **Indiana Invasive Species Council**.

12.1%
Non-cultivated native trees in their pure form.

15.1%
Exotic, non-North American trees that are potentially invasive (have been documented as naturalized in Indiana or in nearby states).

31%
Trees native to North America, but exotic to northern Indiana, and "Nativars" (cultivated varieties of native trees).

39.2%
Exotic, non-North American trees and cultivars thereof without documented examples of naturalized or escaped populations.



Source: Steve Sass, Ecological Advisory Committee Member, South Bend Department of Parks and Recreation

Land Development Guidelines

A common pathway for invasions to occur or spread is when land is disturbed, such as the development of housing, industry, roads, trails, or utilities. General guidelines or contract requirements for the development process could minimize invasive species impacts. Those might include treating invasions on the land before development begins, requiring equipment be cleaned before entering and leaving the property, requiring the use of uncontaminated construction and landscape materials, requiring the use of BMPs, or prohibiting the planting of new invasive plants. See the Additional Resources section for a list of voluntary BMPs that might be considered on development sites.

Model Invasive Species Community Efforts in Indiana

Brown County Native Woodlands Project

The mission of this project is to protect the forests of the Brown County Hills from the devastating effects of invasive plant species through education, training, and eradication of non-native invasive plants.

Example initiatives:

1. In 2007, the project mapped the occurrence on all county roadsides of four prevalent invasive species, to create the foundation for a plan for controlling and eradicating some non-native invasive plants species and to serve as a foundation for grant funds. The results of this work can be seen at http://www.bcnwp.org/road-side-mapping.
2. All invasive species on Brown County State Park were mapped, identifying 14 different species and 2,018 individual occurrences. This map was provided to the state park along with smaller working maps that detail the occurrence of non-native invasive plants in different sections of the park. These smaller maps will be used to direct the treatment of invasive plants on the property and justify funding for invasive plant control for several years to come. Coordinating control on this 16,000-acre property will help minimize outbreaks on adjacent private property. Visit http://www.bcnwp.org/bcsp-mapping to learn more about this project.
3. The group held the annual Nature Daze event, an outreach program to help landowners better understand the importance of managing their property to create a resilient native habitat. Average attendance for this program is 200.

Monroe County Identify and Reduce Invasive Species (MC-IRIS)

This coalition of Monroe County citizens is focused on reducing the environmental and economic impact of invasive species in the county through education and action. Example initiatives:

1. MC-IRIS provides a free invasive plant survey of your land. Visit this web page to apply to have a volunteer tour your property and provide information on plants found and control methods: http://mc-iris.org/invasive-plant-surveys.html.

2. MC-IRIS is collaborating with the Bloomington Urban Woodlands Project (BUWP) to control purple wintercreeper in Dunn's Woods and Latimer Woods. Working together, they have reduced the population of wintercreeper in these two woods by over 90 percent and will work to remove the remainder over the next few years. Since wintercreeper is planted in yards all over town, they contacted neighborhood associations in the area to provide a free opportunity to help identify and control purple wintercreeper in these neighborhoods. Also, residents helped on work days to learn about wintercreeper identification and control. Visit http://mc-iris.org/wintercreeper-control-assistance.html for more information.

3. There are over 100 kudzu sites in Indiana, five of those in Monroe County. The Indiana Department of Entomology and Plant Pathology (DEPP) has treated those five sites for several years. Now, through the Adopt a Kudzu Site project, MC-IRIS visits each site annually and continues treatments as needed, freeing up state resources to take on kudzu in other counties. Visit http://mc-iris.org/adopte-a-kudzu-site.html for more information.

4. Residents of Monroe County can borrow a number of invasive plant control tools through a loan program. To find out more, visit http://mc-iris.org/control-tool-loan-program.html.

Additional Resources

Organizations: Invasive Species is the Primary Mission

Indiana Invasive Species Council: https://www.entm.purdue.edu/iisc/

Midwest Invasive Plant Network: http://www.mipn.org/

Indiana's "Most Unwanted" Invasive Plant Pests Indiana Cooperative Agricultural Pest Survey (CAPS) Program: https://extension.entm.purdue.edu/CAPS/

National Invasive Species Information Center: https://www.invasivespeciesinfo.gov/

National Invasive Species Information Center, Indiana page: https://www.invasivespeciesinfo.gov/us/indiana

National Invasive Species Council: https://www.doi.gov/invasivespecies/

Southern Indiana Cooperative Invasives Management: http://www.sicim.info/

Monroe County Reduce Invasive Species: (MC-IRIS): http://mc-iris.org/

Brown County Native Woodlands Project: http://www.bcnwp.org/

Organizations: Invasive Species is a Secondary Mission or One of Many Missions

Indiana Division of Forestry: http://www.in.gov/dnr/forestry/

Indiana Division of Entomology & Plant Pathology: http://www.in.gov/dnr/entomolo/

Purdue Department of Forestry & Natural Resources Extension: https://www.purdue.edu/fnr/extension/

Purdue Plant & Pest Diagnostic Laboratory: https://www.ppdl.purdue.edu/PPDL/current_interest.html

Indiana Native Plant & Wildflower Society: http://www.inpaws.org/

Indiana Forestry & Woodland Owners Association: http://www.ifwoa.org/

Indiana Land Protection Alliance (alliance of state land trusts): http://www.nature.org/ourinitiatives/regions/northamerica/unitedstates/indiana/partners/ilpa-partners.xml

Technical Assistance

Purdue Department of Forestry and Natural Resources Extension Specialists can help answer your resource management questions: https://www.purdue.edu/fnr/extension/

Indiana Department of Natural Resources (DNR) district foresters provide landowners with forest management advice and assistance: http://www.in.gov/dnr/forestry/4750.htm

USDA Natural Resources Conservation Service (NRCS) provides a wide range of conservation technical assistance: https://www.nrcs.usda.gov/wps/portal/nrcs/main/in/contact/local/

County Soil and Water Conservation District offices are often jointly located with the USDA NRCS and can provide information on local conservation issues and resources: http://iaswcd.org/

Monetary Support

Pulling Together Initiative, National Fish & Wildlife Foundation: http://www.nfwf.org/pti/Pages/home.aspx

Natural Resources Conservation Service conservation programs for landowners: https://www.nrcs.usda.gov/wps/portal/nrcs/in/home/

Identifying Invasive Species

PLANTS database of USDA NRCS: http://plants.usda.gov/java/

CAPS: https://extension.entm.purdue.edu/CAPS/plants.html

Descriptions and photos: http://www.invasive.org/species/weeds.cfm

New Invasive Plants to Watch For – And What to do When You Find Them: https://www.entm.purdue.edu/iisc/pdf/New%20Invasive%20Plants%20To%20Watch%20For%202016.pdf

Invasive Plant Species in Hardwood Tree Plantings: https://www.extension.purdue.edu/extmedia/FNR/FNR-230-W.pdf

Species-Specific Identification and Control Publications

Mile-a-Minute Vine Fact Sheet: https://www.extension.purdue.edu/extmedia/FNR/FNR-481-W.pdf

Japanese Chaff Flower Fact Sheet: https://www.extension.purdue.edu/extmedia/FNR/FNR-477-W.pdf

Poison Hemlock Fact Sheet: https://www.extension.purdue.edu/extmedia/FNR/FNR-437-W.pdf

Palmer Amaranth Biology, Identification, and Management: https://www.extension.purdue.edu/extmedia/WS/WS-51-W.pdf

Species-Specific Identification and Control Videos

Oriental bittersweet: https://www.youtube.com/watch?v=mtw5Gi3S09c

Wintercreeper: https://www.youtube.com/watch?v=rRxHlCeBECg

Callery Pear: https://www.youtube.com/watch?v=yvnd13TJUJc

Multiflora rose: https://www.youtube.com/watch?v=KMThwvYeFX0

Asian bush honeysuckle: https://www.youtube.com/watch?v=uYoRgE7xTQo

Burning bush: https://www.youtube.com/watch?v=tjHpmdOqztQ

Arrest that Pest! Emerald Ash Borer in Indiana: https://extension.entm.purdue.edu/arrestthatpest/

Controlling Invasive Species

Weed Control Methods Handbook: Tools and Techniques for Use in Natural Areas: http://www.invasive.org/gist/handbook.html

Four easy ways to kill Asian bush honeysuckle: http://mc-iris.org/uploads/4/1/1/8/4118817/four_easy_ways_to_kill_asian_bush_honeysuckle.pdf

Useful tools for manual extraction of small invasive shrubs: https://www.entm.purdue.edu/iisc/pdf/ABH_Tool_Info.pdf

Calendar of Control: https://docs.wixstatic.com/ugd/f109ab_acfc3028c5e7490e9747d015bcddca11.pdf

Herbicide Information: Tools and Techniques—Purdue University Weed Science Department maintains a Select-a-Herbicide tool that provides herbicide and application recommendations for weed species on various sites: http://www.purdueweedsci.com/indexNC.php.

The Purdue Pesticide Program has numerous resources covering the safe and efficient use of herbicides: https://ppp.purdue.edu/

Reporting Invasive Species

Report IN is a fast and easy way for you to report invasive species in Indiana. This web-based reporting system includes real-time tracking and distribution maps of invasive species in the state. Data only reflects reporting that has occurred and may be limited, based on local efforts and expertise. Occurrences will likely exist that

are not yet recorded. To see an example of the type of information available, here is a query on "Leafy spurge by county in Indiana": https://www.eddmaps.org/indiana/distribution/uscounty.cfm?sub=3405.

Report IN includes two ways to report—by computer and smartphone. All reports are sent to the appropriate organization for verification. To report by computer, visit www.EDDMapS.org/indiana and create a profile, then click Report Sightings and fill out the form. To report by smartphone, download the Great Lakes Early Detection Network (GLEDN) app. This app is created and maintained by EDDMapS.org. The same EDDMapS profile can be used for both computer and smartphone reports.

Report IN Training Materials: https://www.eddmaps.org/indiana/tools/

How to use Report IN on the website: https://www.entm.purdue.edu/iisc/pdf/how-to-report-on-website.pdf

How to use Report IN on a smartphone: https://www.entm.purdue.edu/iisc/pdf/how-to-report-on-smartphone.pdf

Other Reporting Options

To report by phone, for any type of suspected invasive species, call the Indiana DNR Invasive Species Hotline toll-free: 866 NO EXOTIC (866-663-9684).

Reporting Aquatic Invasive Species: http://www.in.gov/dnr/files/AIS_Reporting_Form.pdf

Contractor Lists

Southern Indiana Cooperative Invasives Management list: http://www.sicim.info/contractors/

Indiana Directory of Professional Foresters: http://www.findindianaforester.org/

Replacement Native Plants

Indiana Native Plant & Wildflower Society: https://indiananativeplants.org/landscaping/

Where to buy native plants: http://www.bcnwp.org/where-to-buy-native-plants

Commercial Greenhouse and Nursery Production: Alternative Options for Invasive Landscape Plants: https://www.extension.purdue.edu/extmedia/ID/ID-464-W.pdf

Alternative Options for Invasive Landscape Plants: https://www.extension.purdue.edu/extmedia/ID/ID-464-W.pdf

Grow Indiana Natives, a statewide voluntary certification program, has been developed to encourage the nursery industry to sell native plants: http://growindiananatives.org/

Regulatory Information

Federal laws regulating invasive species: https://www.invasivespeciesinfo.gov/laws/federal.shtml https://www.invasivespeciesinfo.gov/us/multistate

A list of all Indiana laws related to invasive species is located at: https://www.invasivespeciesinfo.gov/us/indiana

Indiana Noxious Weed Law: http://iga.in.gov/legislative/laws/2017/ic/titles/015/#15-7

Indiana Division of Fish & Wildlife Aquatic Invasive Species Possession Rules: https://www.in.gov/dnr/fishwild/files/fw-AIS_PossessionRules.pdf

Miscellaneous Resources

The Cost of Invasive Species: https://www.fws.gov/verobeach/pythonpdf/costofinvasivesfactsheet.pdf

How to start a Cooperative Weed Management Area: http://www.mipn.org/cwma-resources/

Certified or guaranteed sources of fill and gravel: Indiana Certified Weed Free Program

Best Management Practices

Indiana Invasive Species Council Top Ten List of BMPs for Invasive Species (see complete list below): https://www.entm.purdue.edu/iisc/bmps.php

Extensive list from Wisconsin DNR, includes recreational user groups, forestry, and urban audiences: http://dnr.wi.gov/topic/invasives/bmp.html

Mute swan, Cygnus olor

Top Ten List of Best Management Practices for Invasive Species

The Invasive Plant Advisory Committee of the Indiana Invasive Species Council has developed 10 BMPs to prevent the introduction and spread of invasive species.

1. Develop an organizational invasive species strategy:

- Goals.
- Objectives and priorities.
- Tactics - policies and procedures on:
    - Employee education and training
    - User education
    - Contracting and sourcing
    - Monitoring
    - Prevention
    - Control projects
- Schedule regular assessments – measure and celebrate your success!

2. Create and maintain an invasive species knowledge base:

- Maps - where are current infestations?
- Reporting and mapping process for staff and users.
- Documentation of control projects – exact location, treatment protocol, dates, herbicide concentrations, weather and soil conditions, etc. – and assessment of results initially and after additional growing seasons.

3. Think ahead. Pre-plan major land development or maintenance activities:

- Avoid disturbing heavily infested areas when possible.
- Pre-treat areas that must be disturbed well in advance.
- If possible, conduct such activities when seeds are not easily movable.
- If possible use existing roads, trails, landings, staging areas, and designated equipment cleaning areas.

4. Use native plants and seeds - and make sure they are from "weed-free" sources:

- Use species that are appropriate to site and conditions.
- Assure that species received are as specified.
- Assure that new plants and seeds are not contaminated.
- Use trusted sources whenever possible. (See Indiana Native Plant and Wildflower Society Sources of Native Indiana Plants list.)
- Ask for guarantees or make-good provisions in sourcing contracts.

5. Use uncontaminated construction or landscaping material (mulch, fill, gravel, straw, etc.):

- Find certified or guaranteed sources when possible.
- Use trusted sources whenever possible.
- Ask for guarantees or make-good provisions in sourcing contracts.
- Look to create on-site sources if possible.
- Monitor stockpiles regularly.

6. Keep tools, equipment, vehicles, and clothing clean:

- Require contractors to bring clean vehicles and equipment to your site.
- Designate contained areas for cleaning and disposal.
- Educate and encourage users to inspect and clean clothing, equipment, pets, etc. before and after entry.

7. Have a long-term plan for managing invasives:

- "An ounce of prevention…"
- Prioritize locations and species taking into account severity of infestation, degree of invasiveness, feasibility of control, "value" of habitat at risk, etc.
- Optimize treatment timing and technique.
- Evaluate, measure, and document success.

8. Monitor disturbed locations and high risk areas:

- Monitor regularly and frequently.
- Monitoring is especially important following natural disasters and major development or maintenance projects.

9. Require contractors to follow BMPs:

- Incorporate BMP requirements into RFPs and contracts.
- Inspect and document infestations before and after contractor activity.
- Ask for guarantees or make-good provisions.

10. Educate recreational users (and neighbors) on invasive species BMPs:

- Provide basic education when possible:
    - What are invasive species?
    - Why are they bad?
    - How to identify key species.
- Offer a mechanism for reporting invasives.
- Provide cleaning stations at key entry and exit points.
- Regulate entry of infested material when possible (campfire wood, hay, bait, etc.).

And one to grow on: Actively look for funding opportunities, partnerships, and volunteers to assist in preventing and reducing invasive species.

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Developing an Effective Community Organization

Members of newly-formed community groups are often challenged with making decisions about how to get organized. This section provides a framework for understanding how these types of groups develop over time, with an emphasis on understanding their mission, structure, and processes.

Mission

In the early stages of development, community groups often devote a significant amount of time and energy to the development of a mission statement. These are typically one-sentence declarations that describe why an organization exists. They often summarize what the organization does, as well as who (or what) benefits from it.

Well-written mission statements serve the purpose of informing multiple audiences. They inform external audiences—such as funding sources, the media, and the general public—about what the organization does. For internal audiences, mission statements help to focus, motivate, and guide members of the group. Effective mission statements should also serve to guide the strategic planning and decisions of the organization.

The standard best practice for a mission statement is that it is clear, concise, and useful. It should use concrete language and aim for an 8th grade reading level. The statement should also be short and to the point, and should stay clear of buzzwords. A good rule of thumb is to aim for 5-14 words, with 20 words as a maximum—anything longer may undermine its utility (Korlaar, 2017).

Structure

Group Size

The group's size should reflect its mission, goals, programs, services, and activities. The size of an organization also influences its ability to function effectively and efficiently. While a large group enables greater representation, individual members may feel less needed by the group and, as a result, take on less responsibility. It can also be more challenging to operate, find meeting times, and make decisions with a larger group of people.

On the other hand, a small group may be able to operate more efficiently, but it may lack the broader representation and community outreach that the organization needs. An effective organization strives to strike a balance in the size of its membership. For reference, in the U.S., the average size of a non-profit board is 16 (Hrywna, 2012).

Committees

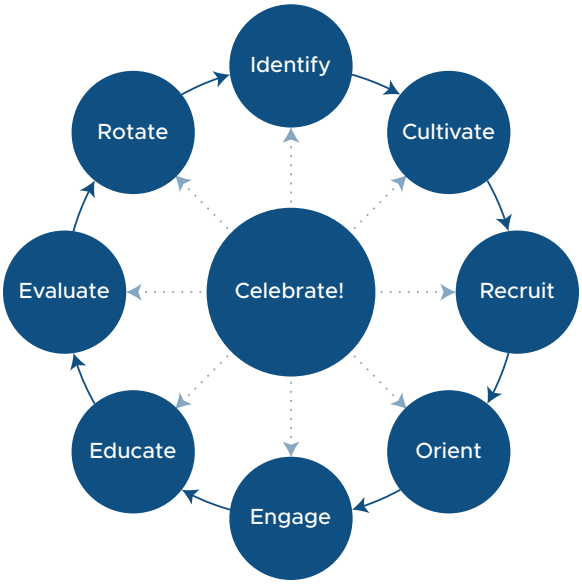
Most groups, over time, develop a subcommittee structure to divide the work, increase the accountability of members, and improve the overall effectiveness of the organization. Over time, most organizations develop standing (permanent) committees, as well as ad-hoc (as needed) committees. The best standard practice is that every organization has at least a

standing committee focused on the overall performance and composition of the group (often referred to as a governance committee).

Committee chairs should be responsible for organizing committee meetings and making sure that committee recommendations are reported back to the organization. Many organizations have developed a model that allows non-members to participate in committee meetings—this practice can serve to increase the impact of the organization in the community while limiting the size of the group's membership.

Processes: The Organizational Development Cycle

Effective groups typically follow a pattern of growth known as the Organizational Development Cycle. Organizations recruit, orient, and engage new members through an eight-step cycle that is in a continuous process of renewal.



Identify

Effective groups begin this process by identifying the qualities and characteristics of potential members based on the needs of the organization to carry out its mission. These qualities include a diversity of skills, knowledge, and connections. To help with this step, an organization may create a group composition matrix that lists these qualities and characteristics, with spaces for names that are generated during the next step of the cycle. A sample matrix is included in the appendices.

Cultivate

During this step, a group will generate a list of potential members, based on the qualities and characteristics identified in the previous step. Effective groups often rely on the help of staff members, volunteers, and others to suggest names and to find ways to connect with those candidates.

Recruit

Groups recruit candidates by informing them about organizational needs, and about how the potential member could possibly help the group fulfil those needs. Effective groups also inform candidates about job descriptions and responsibilities for members, taking care not to minimize those responsibilities.

Orient

During this step of the cycle, new group members are oriented to both the organization (its history, programs, finances, bylaws, calendar of events, etc.) and to the group (committees, other members, meeting calendars, etc.). An orientation can take place at a group meeting led by seasoned members, and provides an excellent time to lay out expectations and set the tone for group service and involvement.

Engage

A group that effectively engages its members often has greater success in retaining those members over time. Efficient meetings and active committees can help new members become more engaged. Effective groups also strive to solicit feedback from their members, and encourage them to become involved in programs and events.

Educate

A highly effective group strives to provide its members with information that is helpful in the decision-making process. One approach is to a send meeting materials packet in advance of each meeting, including the agenda, committee reports, and any supporting documentation associated with actions that a group might make decisions on at a meeting.

Evaluate

As a group matures over time, it is important to occasionally step back, reflect, and review the effectiveness of its work. Successful groups conduct periodic self-assessments to measure that effectiveness and to continue to engage their members.

Rotate

An effective group provides a mechanism for members to resign when the needs of the organization no longer match the qualities, passions, and characteristics of a particular person. One way to do this is by adopting term limits. Effective groups also have succession planning for new leadership as they cycle through the steps of development.

Celebrate

Throughout this cycle, it is important to celebrate the successes of the organization internally, as well as through press releases, community events, and annual reports.

Tips for Managing Volunteers

Community groups often rely on the work of volunteers to carry out their mission. Effective volunteer groups, like effective community organizations, are developed by implementing a set of steps to ensure

appropriate recruitment, development, and retention of helpers. The ISOTURE (identify, select, orient, train, use, recognize, and evaluate) Volunteer Management Model, used in extension programming nationwide, is a seven-step process used to build a sustainable cadre of volunteers for an organization.

Identify

- Identify the organization's needs regarding the skills and characteristics of potential volunteers, and develop volunteer job descriptions based on those needs.
- Cultivate and recruit potential volunteers from a cross-section of the community to fill job descriptions.
- Take advantage of existing volunteer referral services:
    - Local volunteer centers (Indiana Association of Volunteer Centers).
    - Online volunteer matching sites, such as Idealist.org and Volunteermatch.org.
- Develop volunteer application forms to identify a potential volunteer's availability, previous experience, interests, skills, and motives for volunteering.

Select

- Screen potential volunteers through background and reference checks.
- Interview potential volunteers to learn more about their skills, interests, motivations, and attitudes.

Orient

- Give new volunteers the opportunity to learn more about the organization and their role in it.
    - Provide detailed information about the organization's mission and goals.
    - Offer additional opportunities to review job roles and responsibilities, and to answer questions.
- Create opportunities for volunteers to meet staff members.
- Appoint the volunteer to his or her new position.
- Provide the position description to the volunteer and the resources to fulfill the duties.

Train

- Provide volunteers the specific knowledge and skills to carry out their roles and responsibilities.
- Provide opportunities for mentoring from other volunteers and staff members.
- Communicate important information about the organization on a regular basis.
- Train staff members about what motivates volunteers.

Use

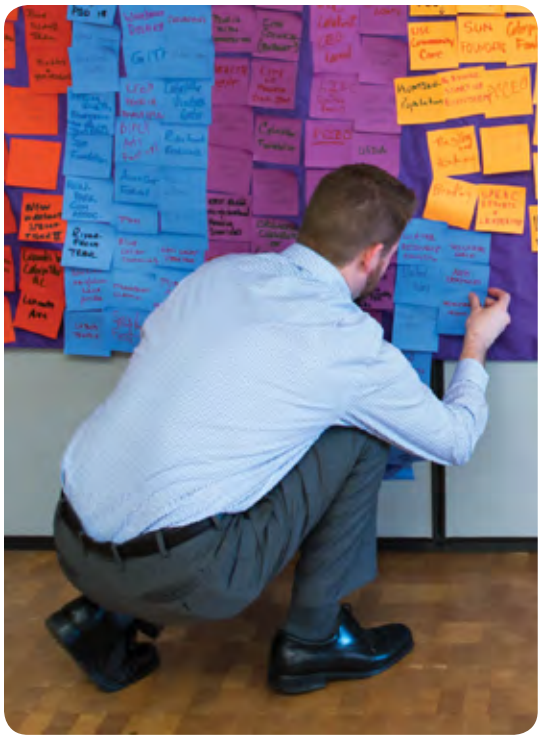
- Treat volunteers as valuable and integral members of the organization's human resources.
- Support volunteers in actively carrying out their responsibilities.

Recognize

- Share organizational accomplishments and milestones with volunteers.
- Provide opportunities to recognize volunteer impact and value in advancing the organization's mission.

Evaluate

- Monitor the service of each volunteer and the overall volunteer program.
- Provide performance-related feedback and a formal performance evaluation at a level appropriate to their involvement in the organization. Volunteers should also have the opportunity to provide feedback to the organization.



Types of Collaborations among Community Organizations

New community groups can often leverage their effectiveness by collaborating with other organizations to take advantage of the networking and efficiencies that exist at a larger scale. The following is a list of the types of collaborations generally found among and between community groups, in increasing levels of formality:

1. **Network** – The most informal type of collaboration, a network allows its members a greater degree of autonomy than in a coalition. In a network, the purpose often involves making connections with similar groups, sharing interests and knowledge, and allowing members to feel as though they are part of something bigger than their organization alone.

2. **Consortium** – Typically, a consortium is an alliance of organizations, usually with a common mission and purpose, that seek to gain a shared benefit. For example, several health clinics might form a consortium to purchase equipment that would have been prohibitively expensive for any one clinic.

3. **Coalition** – A more structured type of collaboration, a coalition has a greater emphasis on getting things done. Autonomy is often sacrificed for the good of group-wide decisions, and the purpose is not so much about making connections and sharing general ideas (as in a network) as it is about focusing narrowly on a specific relevant issue, and working together as a unit to accomplish clearly stated goals related to that issue. In general, the choice of collaboration depends on what the organization wants to accomplish. Does it just want to be more closely connected with other groups working in the field, or is there a clearly-defined objective that it wants to work on?

4. **Partnership** – This is generally regarded as a relationship of two or more organizations in which each has equal status and a certain independence, while maintaining a formal obligation toward a mutual goal they agree could not be achieved alone.

Methods of Decision-Making within Community Groups

- ✓ Majority Vote
- ✓ Consensus
- ✓ Modified Consensus
- ✓ Nominal Group
- ✓ Charting
- ✓ Ranking
- ✓ Robert's Rules of Order

To learn more about these decision-making methods, refer to Facilitator's Guide to Participatory Decision-Making, and Facilitation Skills: Helping Groups Make Decisions. More information is in the Additional Resources section below.

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Sample Board Meeting
November 12, 2015
7:00 p.m.
Monticello Public Library

Time	Agenda Items	Presenter	Purpose
7:00 – 7:05	Welcome	Chair	
7:05 – 7:10	Introduction of New Members	Chair	Information
7:10 – 7:11	Consent Agenda ● October 6 Meeting Minutes ● Presiden'ts Report ● Committee Reports ● Leasing Contract	Chair	Decision
7:11 – 7:20	County Countract Proposal	John Smith	Decision
7:20 – 7:40	Term Limits	Jane Martin	Discussion
7:40 – 8:10	Relocation Proposal	Anette Jones	Discussion
8:10 – 8:25	Summer Outreach Program	Mike Murphy	Decision
8:25	Adjournment	Chair	

Minutes

Minutes from the group's previous meeting should be included in the pre-meeting packet. It is considered a best practice to have also distributed a copy of the minutes earlier—preferably within days following the prior meeting—so that members of the group do not have to wait for the pre-meeting packet to receive the minutes.

Committee Reports

Committee reports should be included in the pre-meeting packet. They should include a summary from the committee's most recent meetings, as well as information that the committee would like for the group as a whole to take action on.

Leader Responsibilities

The meeting leader is responsible for keeping the group focused on important discussions and decisions. If the conversation begins to bog down on details that are better resolved in a smaller group, it is the leader's responsibility to know when to suggest that the topic be moved to committee work. It is also the responsibility of the leader to facilitate group discussions and decision making, allowing everyone at the meeting the opportunity to be heard.

Group Responsibilities

Meeting leaders are not the only ones in the room responsible for an effective meeting. Participants should prepare for the meet-

Implementing Best Practices for Meetings

Effective meetings don't just happen. They require thoughtful planning, leadership, and communication before, during, and after the event. This section outlines key best practices for successful meetings, including the importance of developing a pre-meeting packet, and the responsibilities of the meeting's leader and attendees.

Best Practices

Pre-Meeting Packet

One strategy that contributes to productive and efficient meetings is to provide attendees with adequate information, well enough in advance, so that the group can devote valuable meeting time discussing, deliberating, and deciding on action items. One way to do this is to develop a pre-meeting packet that contains information such as an agenda, minutes, committee reports, relevant articles, and anything else that is relevant to the decision process.

Coordinating and distributing the packet should be the responsibility of the group's leader, secretary, staff members, or another designated member of the group. It's considered best practice to distribute the packet approximately one week before the meeting to allow attendees time to thoroughly review and reflect on the information. The following sections outline the key parts of the packet.

Agendas

A well-designed agenda can lead to more effective meetings that stay on point. Each agenda item should identify the topic of discussion, set the discussion time frame, identify the presenter, and clarify its objective (for example, does a decision need to be made, or is this informational?).

When reviewing the discussion topics, it is worthwhile to also consider the order that items appear on the agenda. Topics needing creative energy should appear early in the meeting when group vitality is at its highest. More mundane items should be scheduled for the end of the meeting when energy levels are at their lowest.

Preparing the agenda is the responsibility of the group's leader, in consultation with the various committee chairs.

The Consent Agenda

A consent agenda is another tool that can lead to more a more efficient meeting. At most meetings, routine agenda items do not usually require discussion. These could include approval of the minutes, reports provided for information only, dates of future meetings, and routine decisions such as contract renewals.

With a consent agenda, these items are approved as a block, without discussion. If an attendee believes that a particular item in a consent agenda requires additional discussion during the meeting, that item may be removed from the consent portion of the agenda and added to the full agenda.

ing by reading the packet in advance. Attendees should also strive to speak concisely and stay on topic. Members of the group should be accountable for their assigned tasks and should participate in a constructive manner.

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