Digital Stereograms
for Land Use Education
in Indiana

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Providing land use education to K-16 students is an important step to prepare the next generation of land use planners. Changes in local land use in the past are ideal education materials for K-16 land use education. The good news is that many land use changes have been recorded with aerial photographs during the past a half century. Stereograms are the perfect solution for students who can view aerial photographs in 3D. Students can quickly load stereograms at their desktop computers and view aerial photographs in 3D, which helps them quickly and easily distinguish features for land use interpretation purposes.

Stereoscopy, stereoscopic imaging or 3-D (three-dimensional) imaging is any technique capable of recording three-dimensional visual information or creating the illusion of depth in an image. The illusion of depth in a photograph is created by presenting a slightly different image to each eye.

Traditional stereoscopic photography consists of creating a 3-D illusion starting from a pair of 2-D images. The easiest way to create depth perception in the brain is to provide to the eyes of the viewer two different images, representing two perspectives of the same object, with a minor deviation similar to the perspectives that both eyes naturally receive in binocular vision. Under some circumstances, no device or additional optical equipment is needed. When the task can be performed without any instruments it is often referred to as naked-eye stereoscopic viewing.

Two separate images are printed side-by-side. When viewed without a stereoscopic viewer the user is required to force his eyes either to cross, or to diverge, so that the two images appear to be three. Then as each eye sees a different image, the effect of depth is achieved in the central image of the three (see Appendix).
The most evident change in these stereograms of the Wea township area in Tippecanoe County is urban sprawl. The south of Lafayette has witnessed drastic urban expansion in the recent years. Urban sprawl in the form of infill development is witnessed in the circular drive in the top right hand corner of the stereogram. The creation of two small lakes is also evident in the lower right hand corner of the pictures from the year 2000. However, the urban development around these waters is proof of urban sprawl with increasing impervious areas. The most obvious change is the general growth and urban expansion in the form of cluster development located in the area that was used for farming in 1939 which has been transformed into subdivisions and recreation. Land use conversions include farm lands converted to wetlands and urban areas.
The majority of the bottom side of the lake is surrounded by wooded area that has been preserved throughout the years along with new development of wooded areas. The area in the top left corner has also been forested. The most obvious change is the impervious urbanization and development along the top side of the lake.
Several different types of urbanization have taken place along the shore of Lake Michigan in Michigan City. Increasing impervious area development has taken place along the entire beach and has eliminated the wooded area which was previously there. Along with lakeside residential properties, much development has taken place inland in the form of adjacent and cluster development. The open land in the central area of the older photograph has been taken over with new residential development and very little space is left unused.
The city of Frenchlick is located within the boundaries of the Hoosier National Forest. This urban area has undergone more changes than most of the protected area. The creation of many roads is evident throughout the city along with urbanization. Adjacent development populates the inner parts of the city as well as cluster development along the north and south outskirts. The wooded areas have been allowed to flourish around the city as well.
Stereograms of the the Broadripple Area in Indianapolis
39°50′36.98″ N 86°10′03.12″ W
Themes: Urbanization & Best Management Practices

Land Use in 1941

Land Use in 1962

Broadripple is a popular area in the city of Indianapolis for urban sprawl & expansion. Cluster development, along with adjacent development, help to fill up the streets of the urban streets. Houses are being built closer to allow for more room and once barren land has been used for residential growth. In the top left corner of the picture you can see where the floodplain has been enhanced and converted to a forested area. The waterway & flood plain are still nicely preserved with wooded areas but increasing impervious areas has begun in the bend of the river and is definitely something that could be more apparent in the future.
The small town of Monon Indiana has survived the years with fewer changes than many urban areas. However, it is evident that infill development has taken place within the city as well as more residential areas being built on the outskirts of the city. Another major change is the development of an industrial area on the southside of town which was converted from farmland. Below the industrial area there is a site that has been converted from farmland to pond (water).
Stereograms of the Burnette’s Reserve in Tippecanoe Township in Tippecanoe County
40° 28’ 24.65” N 86° 51’ 13.77” W
Themes: Best Management Practices & Rural Landscape Changes

Land Use in 1939

Land Use in 1976
Land Use in 2000

This section of the Wabash River has undergone many changes over the years. Heavily wooded areas have been established on either side of the river to help ensure protection of clean waterways and to help discourage erosion. The three sets of stereograms help display the changes that the riverbank has gone through over the years. The river has carved into the land throughout the years and changed slightly along with the outlet which has sliced a winding path on this rural landscape. A few homes have been built along the river but not enough to be considered urban sprawl or impervious development. The biggest change in this rural landscape is the two lane interstate highway and bridge that were built over the river. Although this change has brought more people through the area, extensive steps have been taken to preserve the quality of the floodplain and natural resources in this area.
This area in DeKalb County has undergone some major changes in the past years. The northern section remains comparable to its earlier photos but in the bottom of the pictures the new airport strip is visible. The majority of the wooded area in the central part of the picture has been preserved but some had to be sacrificed for development. The airport has also spurred urbanization along the south and on all sides of the strip. Part of the land is also still being used for agriculture.
This site in LaPorte county has gone through many conversions. The land has always been a crossroads carrying many traffics but the land surrounding those roads has changed greatly. In the earlier photo it is used mainly for agricultural purposes and contains a few wetlands along with a number of wooded areas. The newer photo shows the creation of a number of wetlands in the south along with the development of wooded areas around them. The same process has taken to the land in the upper left of the pictures.
The Purdue Airport has expanded and changed through the years as well as the land around it. The most evident rural landscape change is the lengthening of the runway. There were also additional roads added in the later years along with some miniscule urban development. If you look closely in the new picture you can see where the old runway was. This is a good example of how great of an impact our land use habits have, they last forever.
The creation of one of Indiana’s biggest attractions, Indiana Beach, brought a number of rural landscape changes to the area. The park was originally built on the peninsula and over the water and has continued to expand over the years adding attractions & parking for its visitors. Another area of interest is the lake property opposite the park. This area has witnessed urban sprawl in the form of increasing impervious areas. This lakefront property has numerous residential homes along it.
Stereograms of a Power Plant in LaPorte County
41° 18’ 37.05” N 84° 52’ 25.22” W
Themes: Rural Landscape Change & Land Use Conversion

These stereograms show the rural landscape change and conversion from agricultural use to industrial use. This power plant was a huge introduction to the area which spurred urbanization in neighboring cities not visible in these photos. However, it is noticeable all the roads that were built to accommodate traffic to and from this new facility. The forested area to the right of the photos seems to be preserved ad unchanged and the floodplains of the waterway retained most of their wooded area with some exception for new roads being built.
This site went under a major change to accommodate for the Steel Mill. The bottom part of the picture is the only place where it is evident that trees were left. Much of the land previously being used for agriculture was converted to industrial use. Some of the wooded area in the bottom of the picture remains constant in both sets. There is also an area near the factory that has been converted to a wetland. It is also noted that roads have been built and rebuilt to serve different purposes.
This area of the Hoosier National Forest has undergone a change that is familiar to several other areas of the forest as well. A section of the forest has been converted to wetland by way of flooding the section to create a reservoir. The floodplain has been well built up and preserved with heavily wooded areas.
This is another reservoir created in the Hoosier National Forest. The wetlands to the north were preserved as well as a body of water created to the south. A road is visible in the upper right hand corner of the photo. This area is also void of urbanization and the forest has been allowed to fully develop around the new wetland (reservoir).
Stereograms of the area south of the Indianapolis Airport
39° 41’ 29.36” N 86° 14’35.46” W
Theme: Protected Areas

This land south of the Indianapolis airport has been protected for bat mitigation. The airport bought and reserved this land in reaction to all the expansion & construction they have done. In accordance with the U.S. fish and wildlife organization, since 2002 they have reserved this land as a conserved habitat for the endangered Indiana bat to live and breed safely. The amount of urban expansion in this area is minimal but noticeable on the right side of the newer photos. There was also an interstate built in this area and can be found on the right hand side of this photo as well.
Stereograms of the Game Reserve in LaPorte County
41° 18’ 06.41” N 86° 45’ 50.43” W
Themes: Protected Areas

This area of south LaPorte county has been sanctioned as a game reserve. This area is protected and set aside for the maintenance of wildlife for tourism or hunting purposes. The land has been had trees removed as well as planted to create the optimal habitat to serve its function. This site has remained basically unchanged and rural to this day.
Stereograms of Fish Creek in DeKalb County
41° 29' 42.31” N 84° 50' 45.95” W
Theme: Protected Areas
This site of the Grantsburg area in the Hoosier National Forest has remained similar to its state in the original photos. The forest has become more dense in the north. A road has also been built in the upper right hand of the new picture. Sometimes roads and increased traffic can cause havoc among a wooded area. This area has sustained the natural forestation and has escaped urbanization.
This is another location in the Hoosier National Forest just south of the city of Houston. Like many other areas of the forest, this area remains to be mostly unchanged. In the central part of the photo you can locate a few roads that have been built. In the area to the right of the new photo it is obvious that some of the land has been transformed into wetlands. The forest has grown to cover the almost the entire area without issues of urbanization or deforestation.
Appendix: Viewing Stereo Images.

To view the pair shown here, the viewer should move slightly back from his or her normal viewing distance and place his viewpoint on a line perpendicular to the center of the image. A finger should be placed halfway between the eyes and the image, then the finger should be viewed. The three bright spots between the pictures should become four spots, and the two images become three. If the focus of the eyes is now allowed to drift to the surface of the screen without uncrossing the eyes, a three dimensional depth illusion will appear in the central image. The finger may now be removed from the view. A viewer may find that the extra side images disappear once in-depth view of the central image is stable.

This is a popular way of presenting images on computers but it is difficult to learn and for many viewers the method produces substantial eye-strain, and is not comfortable enough for extended viewing. It also offers none of the advantages that are provided by the stereoscope.