**Objective**

To develop a mobile app decision support tool which facilitates compliance by livestock producers with the new fertilizer regulations. This tool provides a map which allows users to quickly know where the various setbacks are located in relation to a field being evaluated for a nutrient application or temporary storage (staging).

**Introduction**

- Indiana has enacted a new set of nutrient management requirements (355 IAC 8) which include dozens of different factors to be utilized in manure and inorganic fertilizer management. These new regulations impact an estimated 30,000 Indiana farmers and other stakeholders who stage and spread manure from livestock.
- To facilitate compliance by livestock-producers with the new fertilizer regulations, a mobile app decision support tool is being made. This tool will help farmers and other stakeholders decide where in their field they cannot apply or store manure.
- This tool will help improve the economic well-being of people and strengthen ecological and environmental integrity in agricultural landscapes.

**Materials & Method**

- Each waste type has a different type of setbacks as shown in example table 1. Therefore, a flexible map based tool was made to accommodate each of the fertilizer/livestock waste categories.
- To create a visual of the setback all layers were pre-buffered according to the rules set by the Indiana State Chemist Department for each waste type. Arc MAP was used to achieve the above task.
- The application was designed in such a way that it would first ask the user for the fertilizer/livestock waste type. Using the draw tool from the OpenLayers API, the user then has the ability to draw their field on the map.
- The OpenLayers Polygon draw tool was used to give the user the ability to zoom into their field and draw their field on the map as a temporary vector layer.
- Based on the selection of the fertilizer/livestock waste type the features from the corresponding buffered layers would be copied into a temporary layer one at a time. This was achieved using the Geojson script and Bounding Box strategy to tailor it to the specific field area.
- The tool displays the temp layer to the user and allows the user to edit or change the features one at a time. Once the editing of the temp layer is completed, the tool uses WPS intersect and intersect area functions to remove the areas on the field which share the region with the buffers and features.
- All the different temp layers containing the feature types appear on top of the drawn field after they have been edited by the user.
- Now when the user looks at his field then he would only see the areas where he can apply manure or temporarily store it. The other output the tool provides is a table which gives the acreage value of the areas he cannot apply manure in.

**Results**

The farmers will be able to print the final map as shown in Figure 1 and also table 2. From the developers point of view the success is measured by the amount of usage. Low prohibits information gathering of users and therefore success will be measured by the number of hits on our app or website.

**Unresolved Issues**

There are two major issues which are still unresolved:
- a) To download a 10-meter elevation model and built a slope layer to distinguish any slopes greater than 6% percent.
- b) To download high resolution LIDAR data and build a slope layer to distinguish any slopes greater than 6% percent.
- c) To use soil slope data and layer and build a slope to distinguish any slopes greater than 6% percent.
- To transfer data back and forth from Geoserver and mobile apps. Currently we are making the mobile application open a desktop website and are working with it.

**Future Work**

- Testing and debugging on different kinds of Android and iOS Hardware.
- Building a user tutorial for the mobile application.
- Making a feedback user mechanism to help improve the tool.

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**References**

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- Indiana Department of Natural Resources
- Indiana University Information Technology Service
- United States Geologic Survey
- Environmental Protection Agency