API Discussion

Currently the watershed delineation engine supports six states: Indiana, Illinois, Ohio, Michigan, Wisconsin, and Minnesota. Each API is slightly different due to data projection of the background data layers. The various APIs are available on our website.

Three methods to connect:

A. Outside user can click on the Google map and send the coordinates of the point
B. Outside user can send XY or latitude-longitude
C. Outside user can select 12 digit HUC by clicking on the Google map

A. Outside user can click on the Google map and send the coordinates of the point:

You can simply click the "Delineate" button and click on the stream (on the map) whose watershed you plan to analyze. Your location is sent to our L-THIA engine and the watershed of that point is calculated; then you can run L-THIA model on it to predict runoff. You must get a google key to use on your server. The example one below is edited for clarity and will not work on your server

A.1 An example web page interface (for Indiana):

1. Create a new HTML file, say *delineate.html*
2. Copy the included javascript file (*SOA_API.js*) into the same folder as the one containing *delineate.html*.
3. In the "head" section of the html file, include the following lines:
   - <script type="text/javascript" src="./SOA_API.js"></script>
   - <script src="http://maps.google.com/maps?file=api&v=2&key=your_google_key_is_here" type="text/javascript"></script>
4. In the "body" tag, include the onLoad() and onUnload() events:
   - <body onLoad="gup('del')" onUnload="GUnload()">
5. Within the body:
   - Add a textbox and button to allow the user to zoom to a particular location:
     Search for or Zoom-in to your area.
      <input type="text" size="20" id="addressTEXT" value="" />
     <input type="button" value="Search" onClick="showAddress()"/>

     Make sure that you name the elements and functions exactly as mentioned above.

   - Add a form. Include some comments and a button in it:
     <form> Select "Delineate" button and click on the stream whose watershed you plan to analyze. Your location is sent to our L-THIA engine and the

watershed of that point is calculated; then you can run L-THIA model on it to predict runoff. </p>
<input type="button" onClick="delineate()" value="Delineate"> </form>

- Add a division to display the Google map:

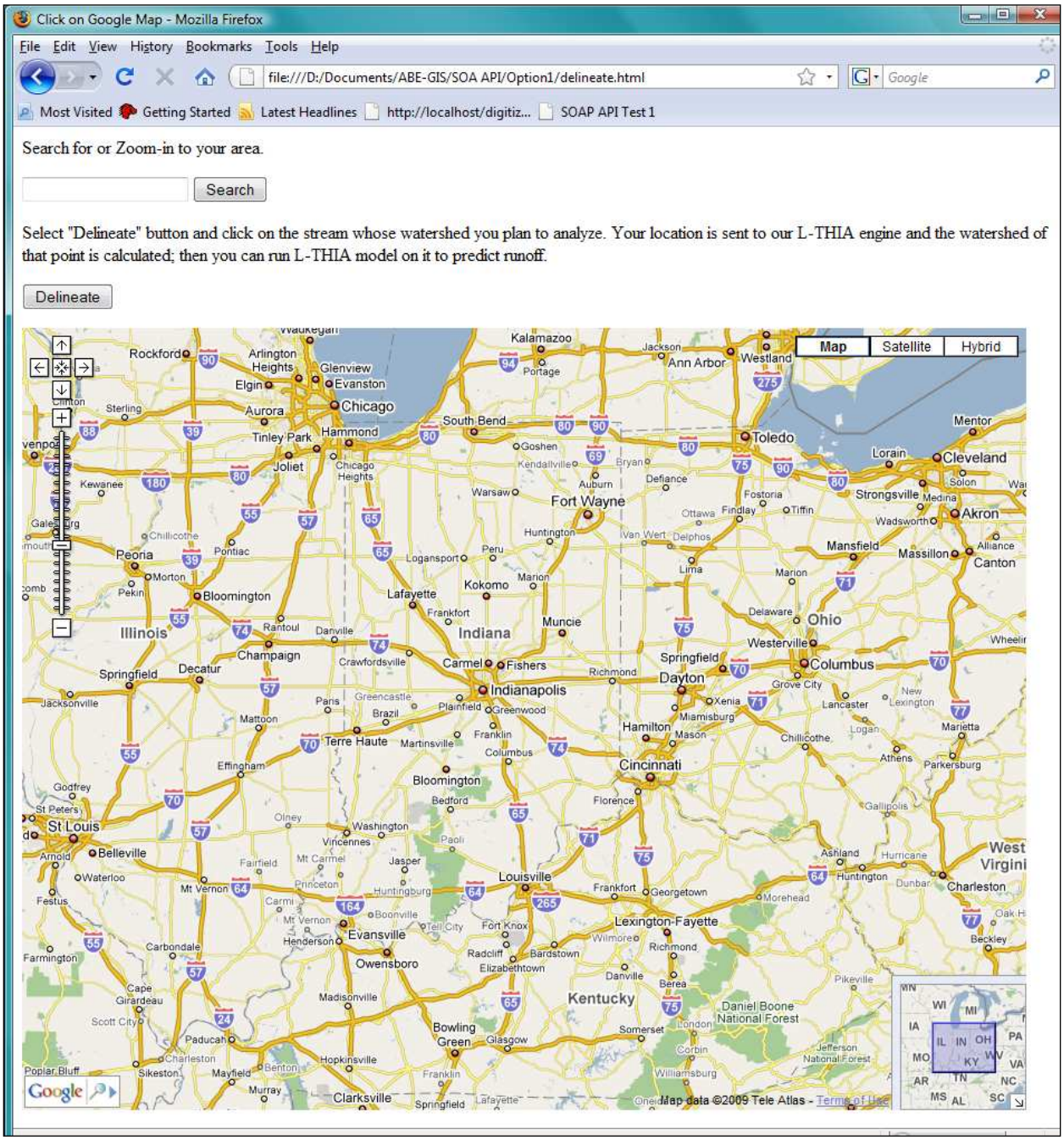
  Make sure that you assign the id as “map”.

6. Finally, close the tags and save the page:
   - </body></html>

A.1.1 The complete example code

```
<head>
 <title>Click on Google Map</title>
 <script type="text/javascript" src="./SOA_API.js"></script>
 <script
src="http://maps.google.com/maps?file=api&amp;v=2&amp;key=ABQIAAAAglYHXGbubeUrhnRLruWO6BR29AK4v6vOccNsPT-eAt7UZgF8PRTQxYr2HWv436_sXPUm0nja8lcGtA"
    type="text/javascript">
// register with Google to get your own key, unique to a server, http://code.google.com/apis/maps/signup.html
</script>
</head>

<body onLoad="gup( 'del' )" onUnload="GUnload()">
 <p>Search for or Zoom-in to your area. </p>
 <p>
  <input type="text" size="20" id="addressTEXT" value="" />
  <input type="button" value="Search" onClick="showAddress()"/>
 </p>

 <form>
  <p>Select &quot;Delineate&quot; button and click on the stream whose watershed you plan to analyze. Your location is sent to our L-THIA engine and the watershed of that point is calculated; then you can run L-THIA model on it to predict runoff. </p>
  <input type="button" onClick="delineate()" value="Delineate">
 </form>

 <div id="map" style="width:900px; height: 700px"></div>

</body>
</html>
```

A.1.2 A snapshot of the example webpage



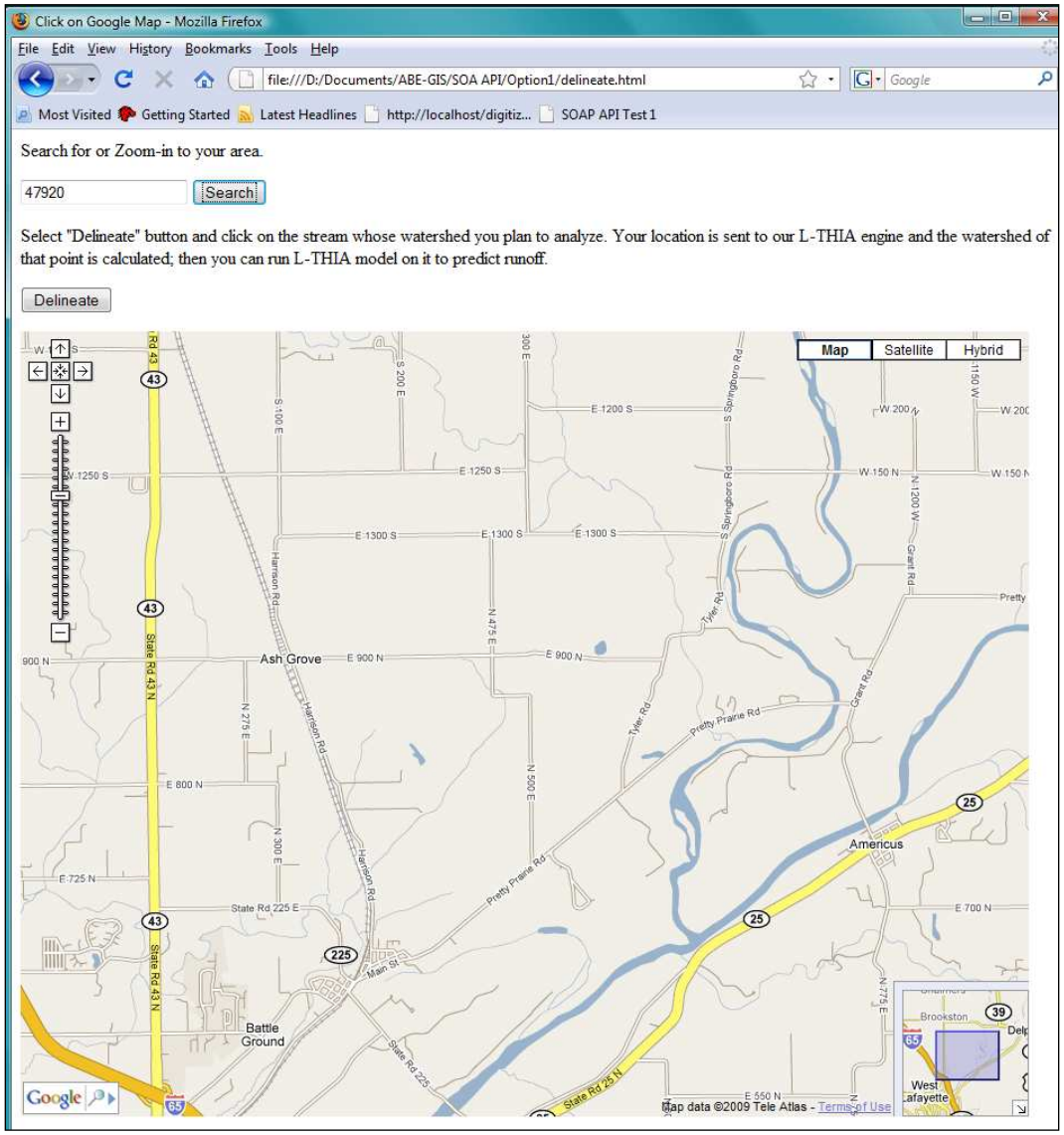
A.1.3 Closing remarks about the code

You can format the interface in any way you like but make sure that you include all the elements mentioned above and name them exactly as they appear above. The name of your HTML file does not matter though.

A.2 Using the interface

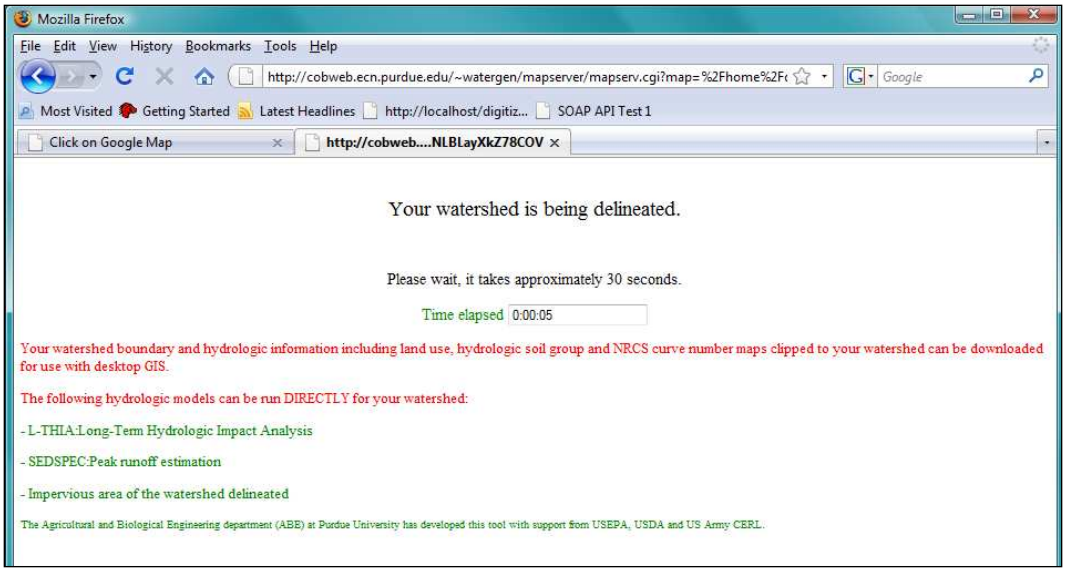
An example of using the interface just constructed is described in this section. Screenshots follow some of the steps.

- To enter a specific location, enter the address or only the zip code and click “Search”

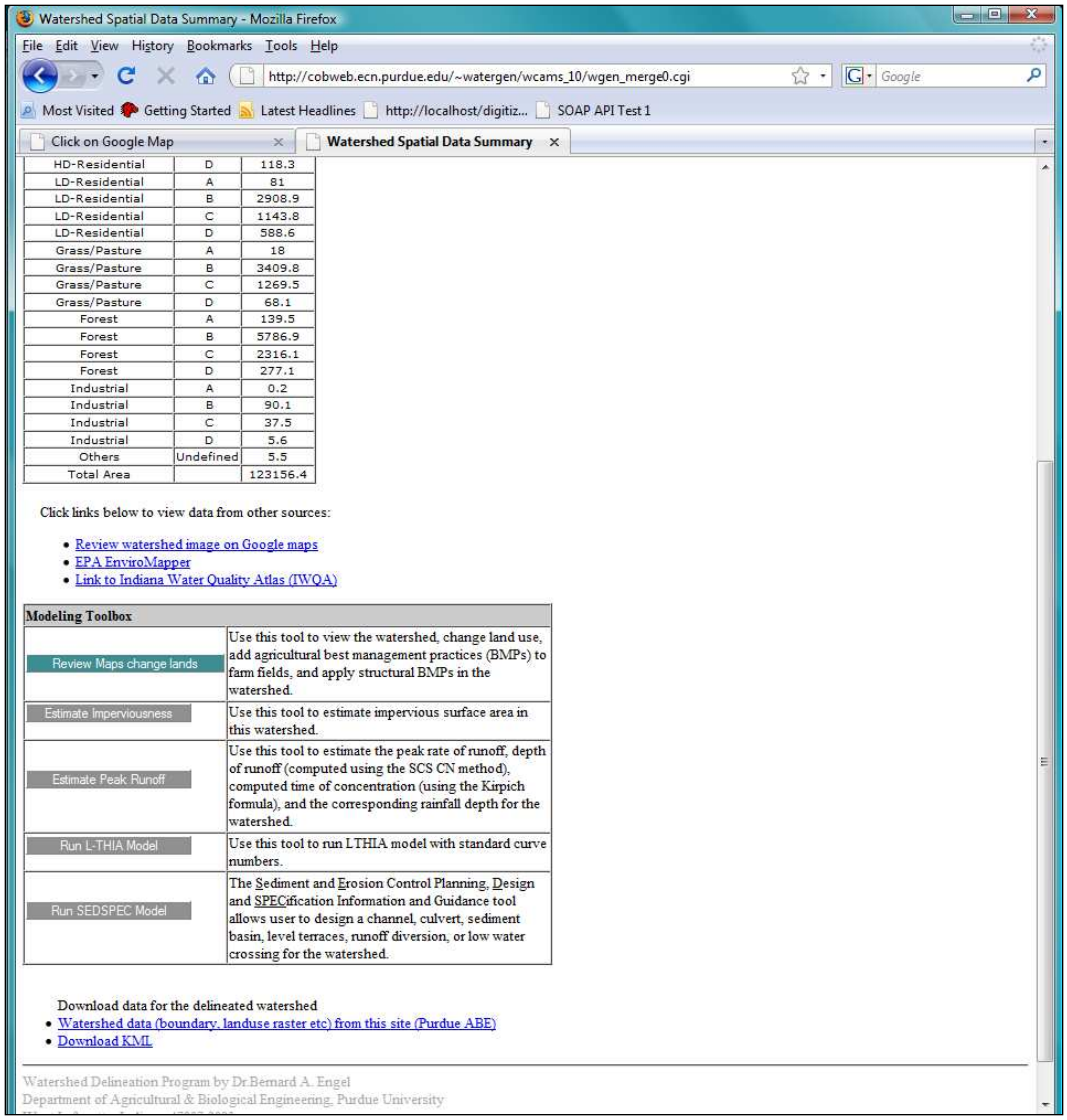


- Click “Delineate” and then, on the map, click on the stream whose watershed you plan to analyze. Make sure that you do it in the mentioned sequence: the “Delineate” button and then the map

- Once you do that, a new window will open which will require you to wait for a few moments



- You will then be automatically redirected to a page where you can download the KML by clicking on “Download KML” or the shape file by clicking on “Watershed data (boundary, landuse raster etc) from this site (Purdue ABE)”



HD-Residential	D	118.3
LD-Residential	A	81
LD-Residential	B	2908.9
LD-Residential	C	1143.8
LD-Residential	D	588.6
Grass/Pasture	A	18
Grass/Pasture	B	3409.8
Grass/Pasture	C	1269.5
Grass/Pasture	D	68.1
Forest	A	139.5
Forest	B	5786.9
Forest	C	2316.1
Forest	D	277.1
Industrial	A	0.2
Industrial	B	90.1
Industrial	C	37.5
Industrial	D	5.6
Others	Undefined	5.5
Total Area		123156.4

Click links below to view data from other sources:

- Review watershed image on Google maps
- EPA EnviroMapper
- Link to Indiana Water Quality Atlas (IWQA)

Modeling Toolbox	
Review Maps change lands	Use this tool to view the watershed, change land use, add agricultural best management practices (BMPs) to farm fields, and apply structural BMPs in the watershed.
Estimate Imperviousness	Use this tool to estimate impervious surface area in this watershed.
Estimate Peak Runoff	Use this tool to estimate the peak rate of runoff, depth of runoff (computed using the SCS CN method), computed time of concentration (using the Kirpich formula), and the corresponding rainfall depth for the watershed.
Run L-THIA Model	Use this tool to run LTHIA model with standard curve numbers.
Run SEDSPEC Model	The Sediment and Erosion Control Planning, Design and SPECification Information and Guidance tool allows user to design a channel, culvert, sediment basin, level terraces, runoff diversion, or low water crossing for the watershed.

Download data for the delineated watershed

- Watershed data (boundary, landuse raster etc) from this site (Purdue ABE)
- Download KML

Watershed Delineation Program by Dr.Bernard A. Engel
Department of Agricultural & Biological Engineering, Purdue University

B. Outside user can send XY or latitude-longitude:

You can enter specific latitude-longitude or UTM Zone16 N coordinates (Details vary by state. Use UTM 16 for IN, WI, IL; or MOM-H for MI, UTM15 for MN and UTM 17 for OH. See the individual states API for details.)

B.1 An example web page interface:

7. Create a new HTML file, say *latlong.html*
8. Copy the included javascript file (*SOA_API.js*) into the same folder as the one containing *latlong.html*.
9. In the "head" section of the html file, include the following line:
    - <script type="text/javascript" src="./SOA_API.js"></script>
10. In the "body" tag, include the onLoad() and onUnload() events:
    - <body onLoad="gup('del')" onUnload="GUnload()">
11. Within the body, add a form:
    - <form name="ztwdbypoint" method="post" action="http://cobweb.ecn.purdue.edu/~watergen/wcams_10/qcounty_xy0.cgi" onSubmit="return ChkCS();">

    Make sure that you name the form and functions exactly as mentioned above.

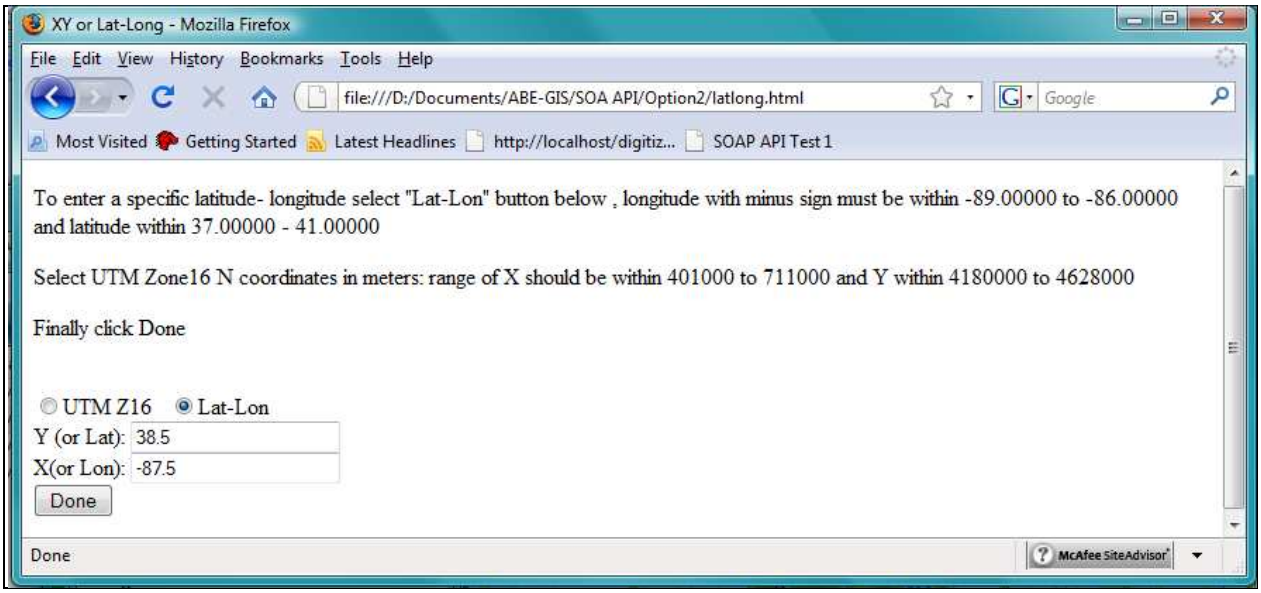
    - Add some explanatory text:
      Select UTM Zone16 N coordinates in meters: range of X should be within 401000 to 711000 and Y within 4180000 to 4628000
       Finally click Done
    - Then add some radio buttons and input text boxes. Again, be careful to name the elements exactly as mentioned below:

<input type="radio" name="cs" value="0" checked>UTM Z16
      <input type="radio" name="cs" value="1">Lat-Lon
      Y (or Lat): <input type="text" name="cx" value="">
<!-- -->
      X(or Lon): <input type="text" name="cy" value="">
    - Now add some hidden elements. These may seem unnecessary but are required for the javascript functions to work. So, please do not forget to include these:
      <input type="hidden" name="img_extent" value="">
      <input type="hidden" name="img_xycoord" value="">
      <input type="submit" name="submit" value="Done">
12. Finally, close the tags and save the page:
    - </form></body></html>

B.1.1 The complete example code

```
<html>

<head>
  <title>XY or Lat-Long</title>
  <script type="text/javascript" src="./SOA_API.js"></script>
</head>

<body onLoad="gup( 'del' )" onUnload="GUnload()">
  <form name="ztwdbypoint" method="post"
action="http://cobweb.ecn.purdue.edu/~watergen/wcams_10/qcounty_xy0.cgi" onSubmit="return ChkCS();">
    <p><a name="xy" id="xy"></a>To enter a specific latitude- longitude select "Lat-Lon" button below , longitude
with minus sign must be within -89.00000 to -86.00000 and latitude within 37.00000 - 41.00000</p>
    <p>Select UTM Zone16 N coordinates in meters: range of X should be within 401000 to 711000 and Y within
4180000 to 4628000</p>
    <p> Finally click Done</p>

    <br><input type="radio" name="cs" value="0" checked>UTM Z16  
    <input type="radio" name="cs" value="1">Lat-Lon<br>
    Y (or Lat): <input type="text" name="cx" value=""><br><!--  -->
    X(or Lon): <input type="text" name="cy" value=""><br>
    <input type="hidden" name="img_extent" value="">
    <input type="hidden" name="img_xycoord" value="">
    <input type="submit" name="submit" value="Done">
  </form>
</body>

</html>
```

B.1.2 A snapshot of the example webpage



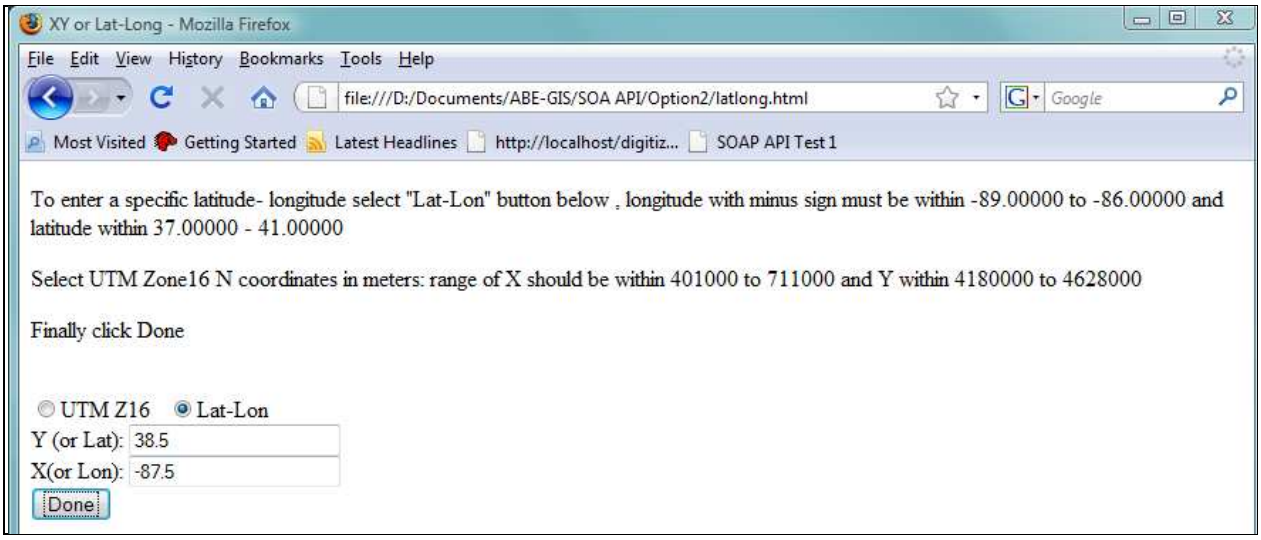
B.1.3 Closing remarks about the code

You can format the interface in any way you like but make sure that you include all the elements mentioned above and name them exactly as they appear above. The name of your HTML file does not matter though.

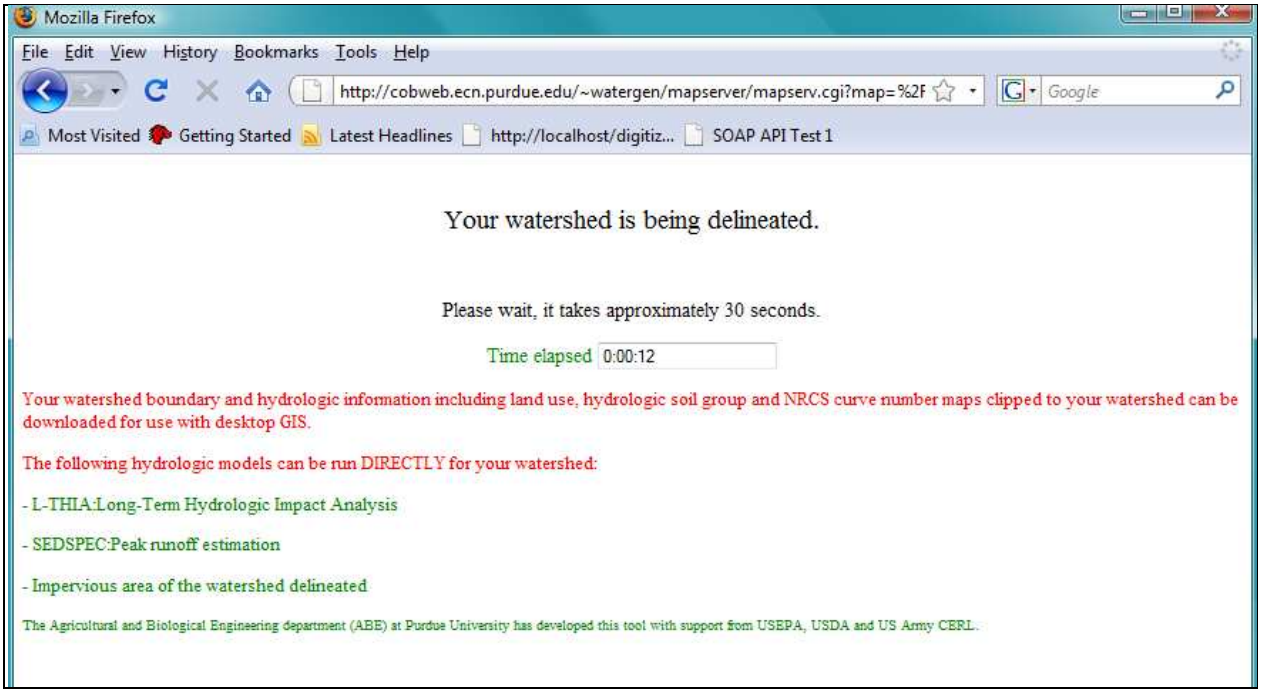
B.2 Using the interface

To enter a specific latitude-longitude (screenshots follow some steps):

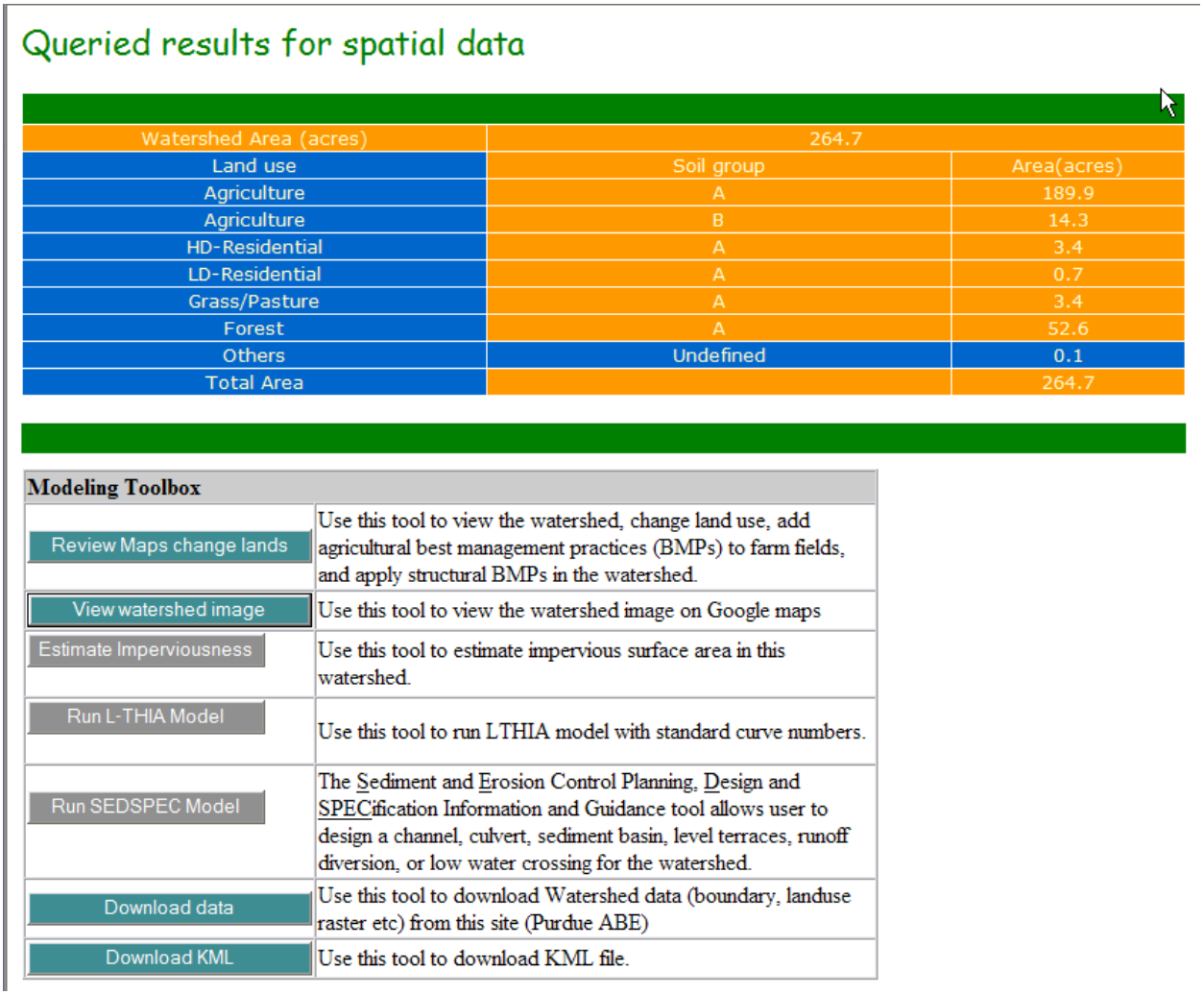
- Select the "Lat-Lon" radio button (shown in the following example)
- Enter the latitude in the textbox labeled “Y (or Lat)”. Latitude must be positive and within 37.00000 - 41.00000
- Enter the longitude in the textbox labeled “X (or Lon)”. Longitude with minus sign must be within -89.00000 to -86.00000
- Finally click “Done”.



- A new window will open which will require you to wait for a few moments



- You will then be automatically redirected to a page where you can download the KML by clicking on “Download KML” or the shape file by clicking on “Watershed data (boundary, landuse raster etc) from this site (Purdue ABE)”



Queried results for spatial data

Watershed Area (acres)	264.7	
Land use	Soil group	Area(acres)
Agriculture	A	189.9
Agriculture	B	14.3
HD-Residential	A	3.4
LD-Residential	A	0.7
Grass/Pasture	A	3.4
Forest	A	52.6
Others	Undefined	0.1
Total Area		264.7

Modeling Toolbox	
Review Maps change lands	Use this tool to view the watershed, change land use, add agricultural best management practices (BMPs) to farm fields, and apply structural BMPs in the watershed.
View watershed image	Use this tool to view the watershed image on Google maps
Estimate Imperviousness	Use this tool to estimate impervious surface area in this watershed.
Run L-THIA Model	Use this tool to run LTHIA model with standard curve numbers.
Run SEDSPEC Model	The Sediment and Erosion Control Planning, Design and SPECification Information and Guidance tool allows user to design a channel, culvert, sediment basin, level terraces, runoff diversion, or low water crossing for the watershed.
Download data	Use this tool to download Watershed data (boundary, landuse raster etc) from this site (Purdue ABE)
Download KML	Use this tool to download KML file.

C. Outside user can select 12 digit HUC by clicking on the Google map:

You can simply click the “HUC 12” button and click on the desired watershed on the map.

C.1 An example web page interface:

1. Create a new HTML file, say *huc12.html*
2. Copy the included javascript file (*SOA_API.js*) into the same folder as the one containing *huc12.html*.
3. In the “head” section of the html file, include the following lines:
   - <script type="text/javascript" src="./SOA_API.js"></script>
   - <script src="http://maps.google.com/maps?file=api&v=2&key=ABQIAAAAglYHXGbubeUrhnRLruWO6BR29AK4v6vOccNsPT-eAt7UZgF8PRTQxYr2HWv436_sXPUm0nja8lcGtA" type="text/javascript"></script>
4. In the “body” tag, include the onLoad() and onUnload() events:
   - <body onLoad="gup('del')" onUnload="GUnload()">
5. Within the body:
   - Add a textbox and button to allow the user to zoom to a particular location:
     Search for or Zoom-in to your area.
      <input type="text" size="20" id="addressTEXT" value="" />
     <input type="button" value="Search" onClick="showAddress()"/>

     Make sure that you name the elements and functions exactly as mentioned above.

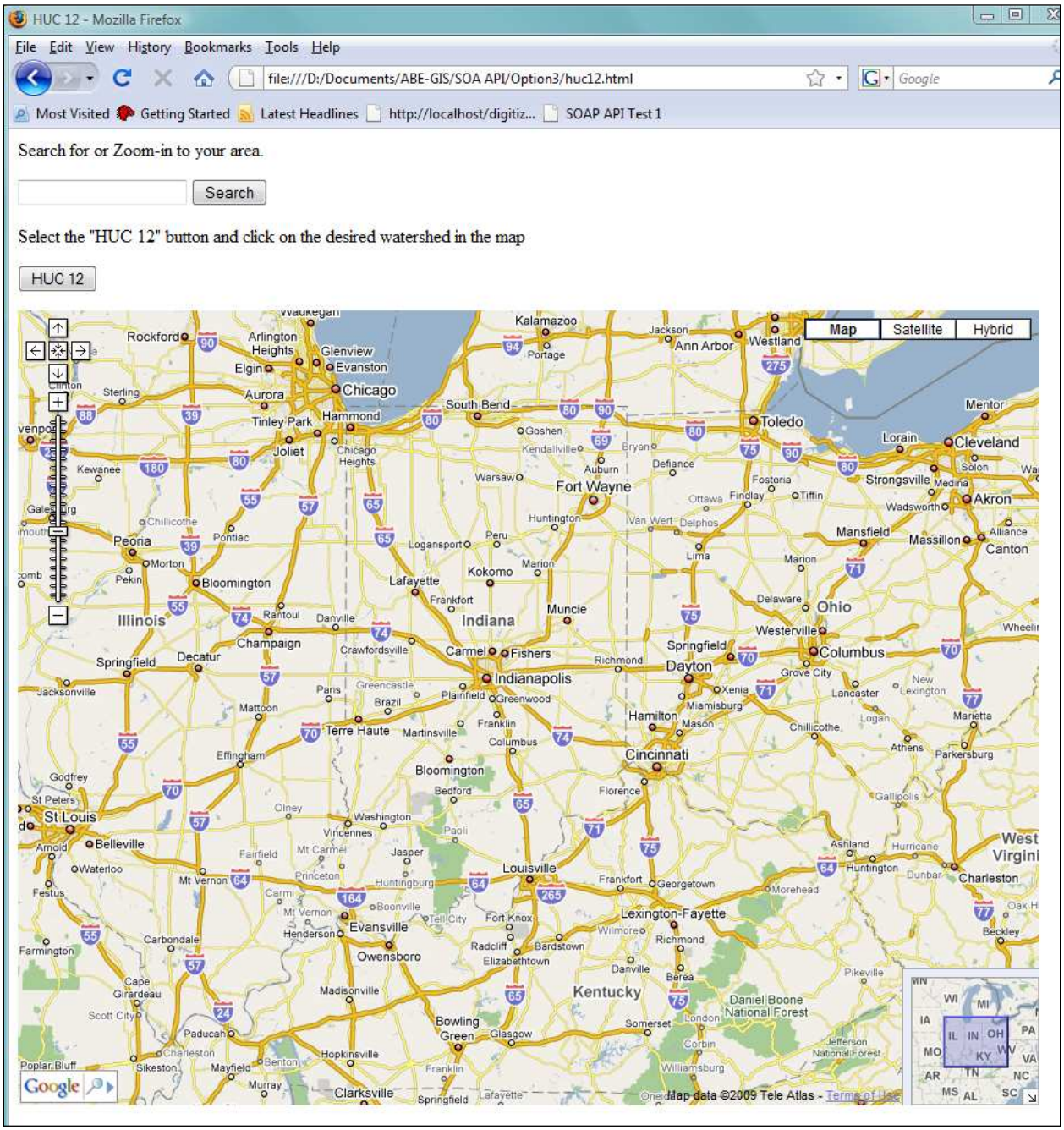
   - Add a form. Include some comments and a button in it:
     <form> Select the "HUC 12" button and click on the desired watershed in the map
     <input type="button" onClick="HUA12()" value="HUC 12"> </form>
   - Add a division to display the Google map:

     Make sure that you assign the id as “map”.
6. Finally, close the tags and save the page:
   - </body></html>

C.1.1 The complete example code

```
<head>
 <title>HUC 12</title>
 <script type="text/javascript" src="./SOA_API.js"></script>
 <script
src="http://maps.google.com/maps?file=api&amp;v=2&amp;key=ABQIAAAAglYHXGbubeUrhnRLruWO6BR29AK4v
6vOccNsPT-eAt7UZgF8PRTQxYr2HWv436_sXPUm0nja8lcGtA"
    type="text/javascript"></script>
</head>

<body onLoad="gup( 'del' )" onUnload="GUnload()">
 <p>Search for or Zoom-in to your area. </p>
 <p>
  <input type="text" size="20" id="addressTEXT" value="" />
  <input type="button" value="Search" onClick="showAddress()"/>
 </p>

 <form>
  <p>Select the &quot;HUC 12&quot; button and click on the desired watershed in the map</p>
  <input type="button" onClick="HUA12()" value="HUC 12">
 </form>

          <div id="map" style="width:900px; height: 700px"></div>

</body>
</html>
```

C.1.2 A snapshot of the example webpage



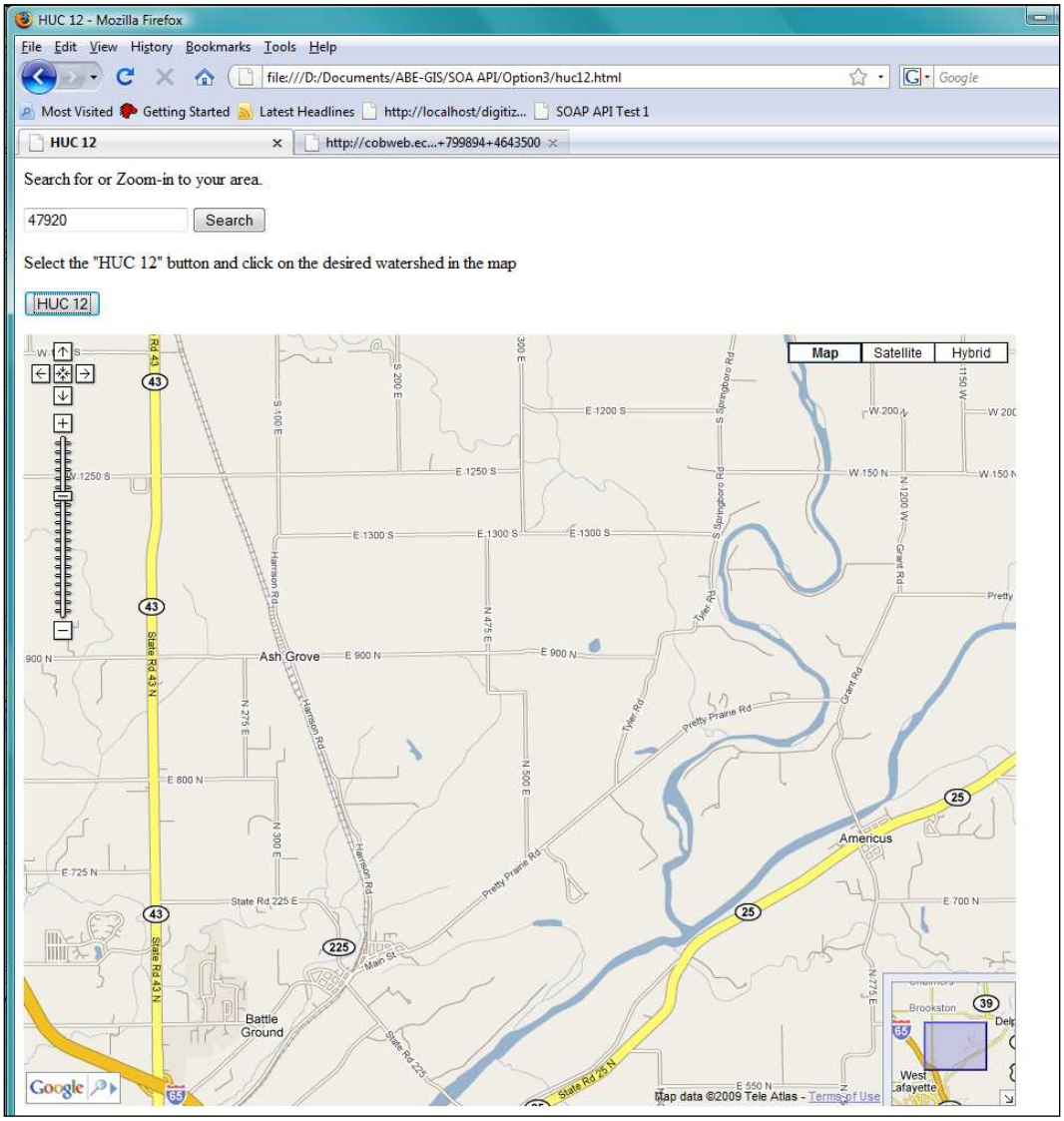
C.1.3 Closing remarks about the code

You can format the interface in any way you like but make sure that you include all the elements mentioned above and name them exactly as they appear above. The name of your HTML file does not matter though.

C.2 Using the interface

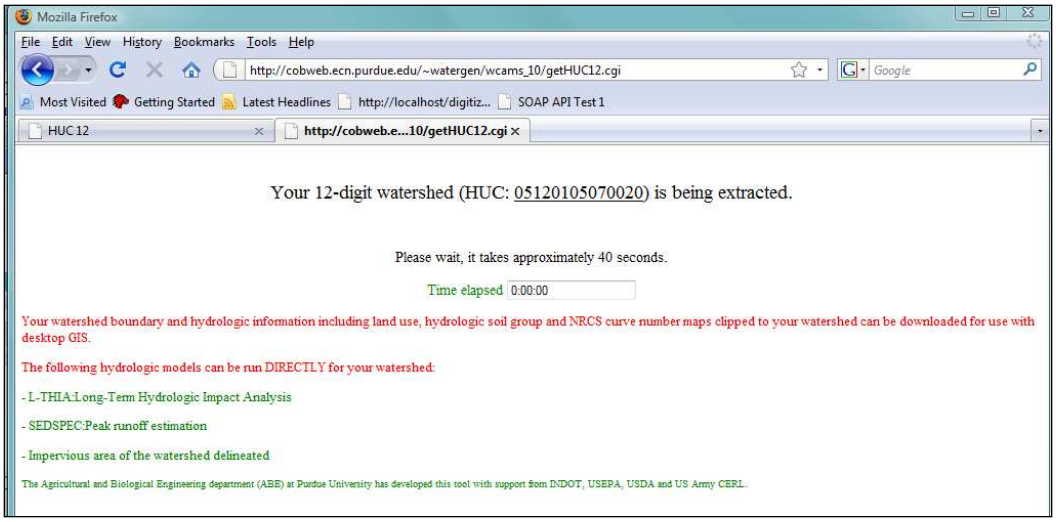
An example of using the interface just constructed is described in this section. Screenshots follow some of the steps.

- To enter a specific location, enter the address or only the zip code and click “Search”

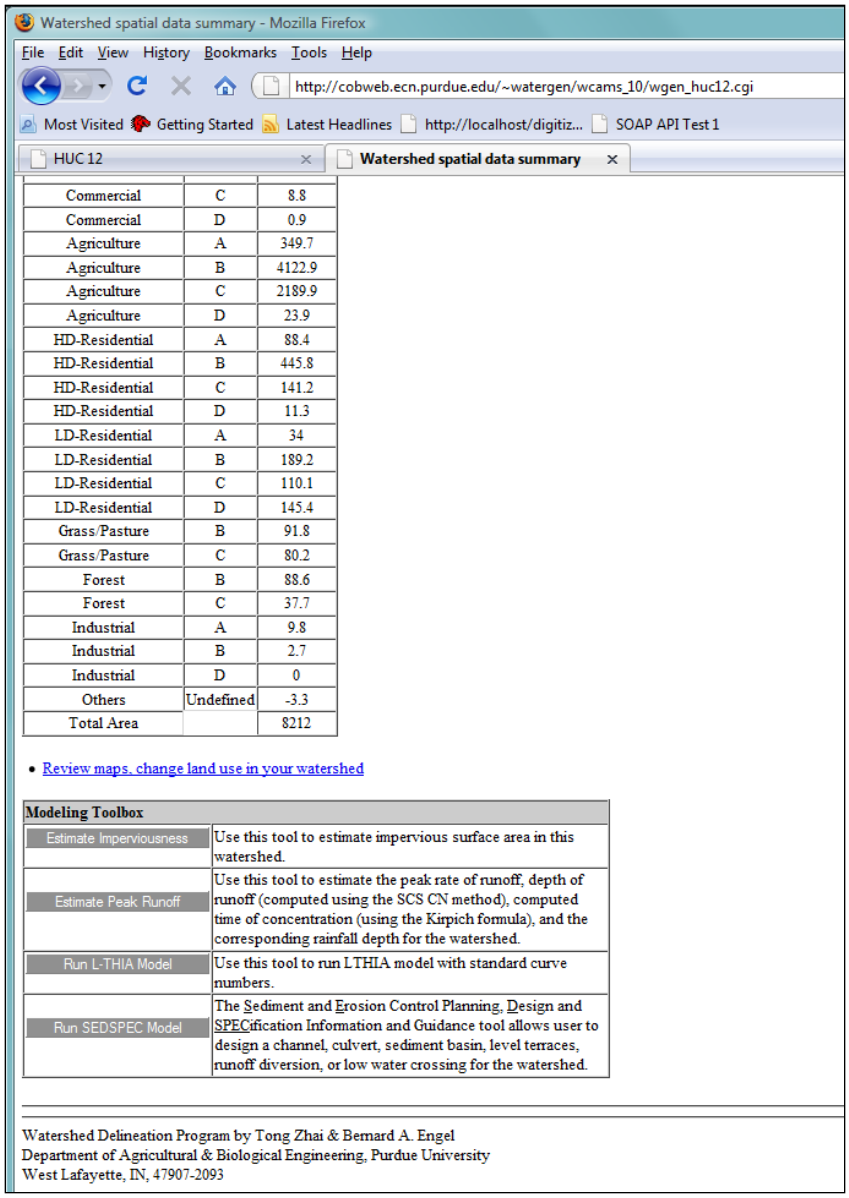


- Click “HUC 12” and then, on the map, click on the desired watershed you plan to analyze. Make sure that you do it in the mentioned sequence: the “HUC 12” button and then the map

- Once you do that, a new window will open which will require you to wait for a few moments



- You will then be automatically redirected to a page where you can download the shape file by clicking on “Review maps, change land use in your watershed”



Commercial	C	8.8
Commercial	D	0.9
Agriculture	A	349.7
Agriculture	B	4122.9
Agriculture	C	2189.9
Agriculture	D	23.9
HD-Residential	A	88.4
HD-Residential	B	445.8
HD-Residential	C	141.2
HD-Residential	D	11.3
LD-Residential	A	34
LD-Residential	B	189.2
LD-Residential	C	110.1
LD-Residential	D	145.4
Grass/Pasture	B	91.8
Grass/Pasture	C	80.2
Forest	B	88.6
Forest	C	37.7
Industrial	A	9.8
Industrial	B	2.7
Industrial	D	0
Others	Undefined	-3.3
Total Area		8212

- Review maps, change land use in your watershed

Modeling Toolbox	
Estimate Imperviousness	Use this tool to estimate impervious surface area in this watershed.
Estimate Peak Runoff	Use this tool to estimate the peak rate of runoff, depth of runoff (computed using the SCS CN method), computed time of concentration (using the Kirpich formula), and the corresponding rainfall depth for the watershed.
Run L-THIA Model	Use this tool to run LTHIA model with standard curve numbers.
Run SEDSPEC Model	The Sediment and Erosion Control Planning, Design and SPECification Information and Guidance tool allows user to design a channel, culvert, sediment basin, level terraces, runoff diversion, or low water crossing for the watershed.

Watershed Delineation Program by Tong Zhai & Bernard A. Engel
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West Lafayette, IN, 47907-2093