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Construction of an Indiana Water Monitoring Inventory Using the Google Maps API

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The Construction of Indiana Water Monitoring Inventory using Google Maps API

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Need for Inventory

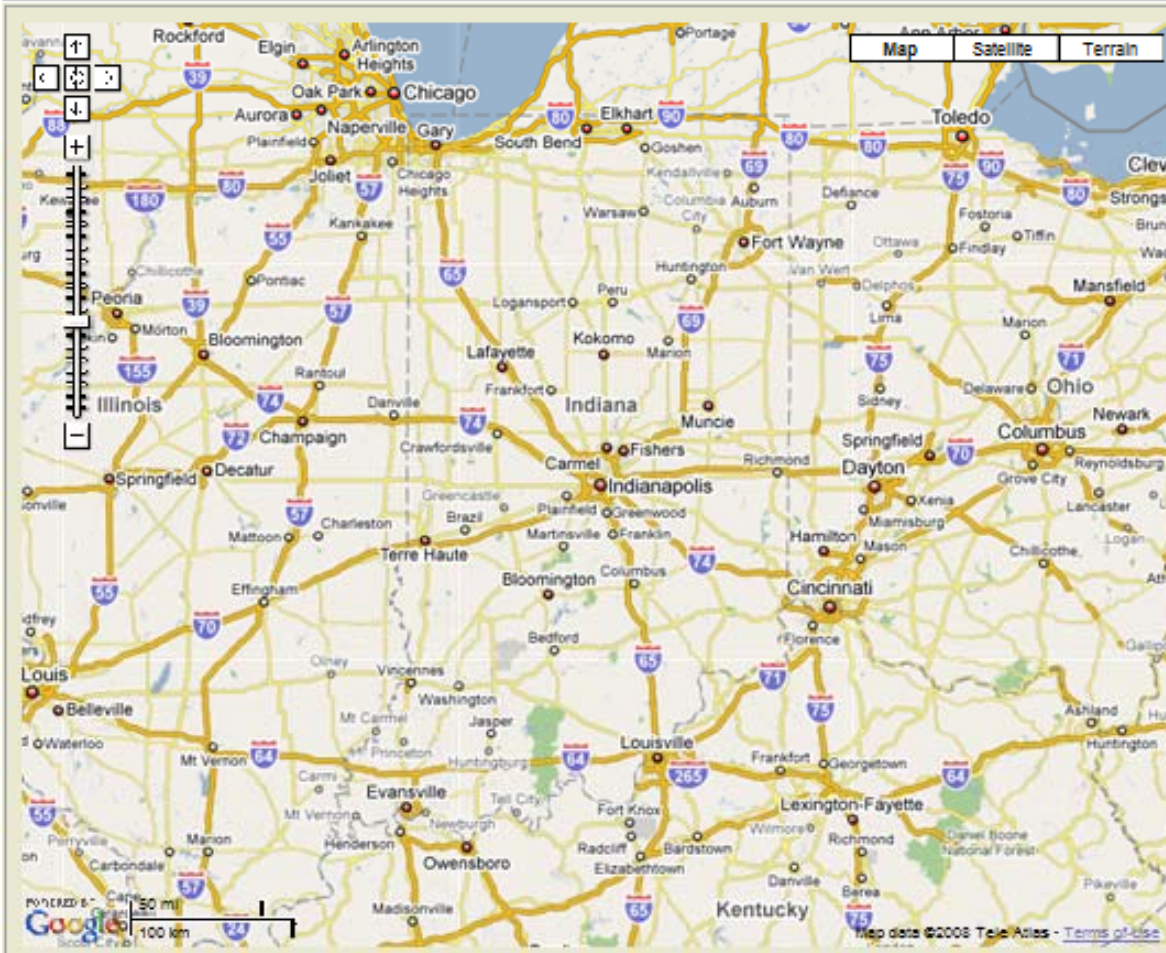
- Monitoring conducted at many locations within Indiana's waters by a variety of government agencies and organizations
 - The information and location may be difficult to find
 - Displays information and location
 - Determine what data have been collected
 - Lets user contact the data holders or their web site for more information
 - Enables data holder to upload water monitoring information
-

Indiana Water Monitoring Inventory



Indiana Water Monitoring Inventory

A central hub for water monitoring locations of Indiana streams, lakes, and groundwater.

[Home](#)[Introduction](#)[Fact Sheet](#)[Video Instructions](#)[Provide Feedback](#)[Quick Guide](#)[FAQs](#)[Newsletters](#)[Contact Us](#)

View Monitoring Locations

To view all monitoring locations, select:

To refine your search, use the criteria below to select locations:

1. Agency Type:

Agency/Organization:

2. Location Name:

Type any part of a river or name of monitoring location (e.g., "Wabash")

3. Parameter Type: clicking more than one parameter will result in monitoring locations that include any of the parameter types checked.

- | | |
|---|--|
| <input type="checkbox"/> All | <input type="checkbox"/> Habitat |
| <input type="checkbox"/> Aquatic Plants/Algal Biomass | <input type="checkbox"/> Lake Clarity |
| <input type="checkbox"/> Bacteriology/Microbiology | <input type="checkbox"/> Macroinvertebrates |
| <input type="checkbox"/> Fish | <input type="checkbox"/> Metals |
| <input type="checkbox"/> Flow/Stage | <input type="checkbox"/> Nutrients |
| <input type="checkbox"/> General Chemistry | <input type="checkbox"/> Organics/Pesticides |
| <input type="checkbox"/> Groundwater Level | <input type="checkbox"/> Radiological |
| <input type="checkbox"/> Groundwater Quality | |

4. Hydrologic Unit Code:

GoogleMaps API (Application Programming Interface)

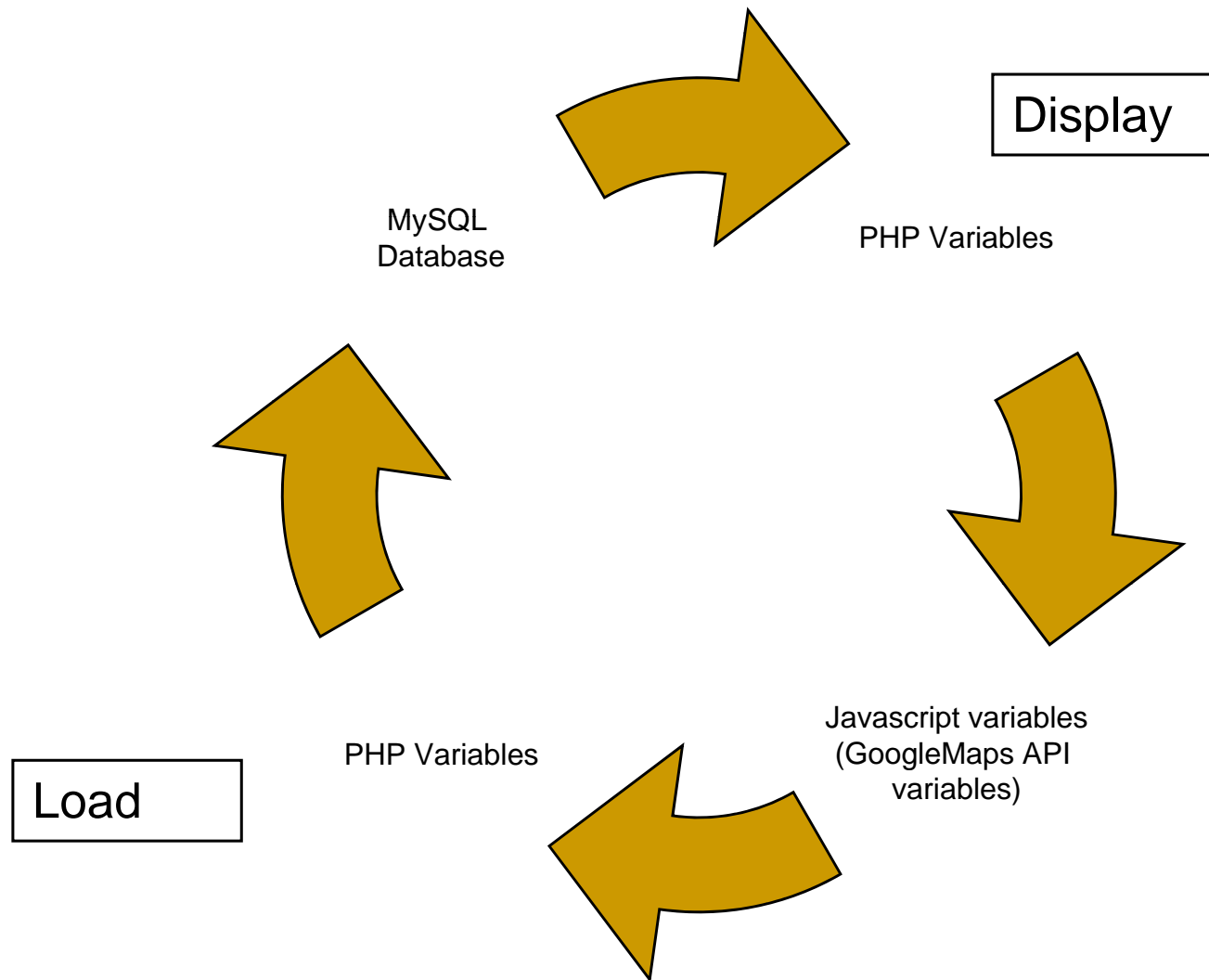
- What is it?

GoogleMaps utilities programmed in Java Script, which can be embedded in any webpage

- Why GoogleMaps?

- Supports variety of types of imagery such as map, satellite image, and terrain map.
 - Any customized application can be integrated conveniently
 - User Friendly
-

How inventory works



What is Javascript?

- designed to add interactivity to HTML pages
- usually embedded directly into HTML pages
- an interpreted language
- Everyone can use JavaScript without purchasing a license
- Client Side Script

(Reference: W3Schools Webpage,

http://www.w3schools.com/js/js_intro.asp)

PHP

- PHP is a widely-used general-purpose scripting language that is especially suited for Web development and can be embedded into HTML

(Reference: PHP website, <http://www.php.net>)

- Server Side Script
 - Supports variety of database types including MySQL
-

Database Structure

Database

```
graph TD; Database[Database] --- Info["Indiana Water Monitoring Info (Latitude, Longitude, Name, Agency, Agency Type, Site Number, Address, parameter type, parameter, frequency, publicity, recording period, contact, Hydrologic Unit code, Login ID)"]; Database --- Login["Login Information (Login ID, email, Name, agency, Address)"]; Database --- Agency["Agency Information (Sub agencies According to agency Type)"];
```

Indiana Water Monitoring Info
(Latitude, Longitude, Name,
Agency, Agency Type,
Site Number, Address,
parameter type, parameter,
frequency, publicity,
recording period, contact,
Hydrologic Unit code,
Login ID)

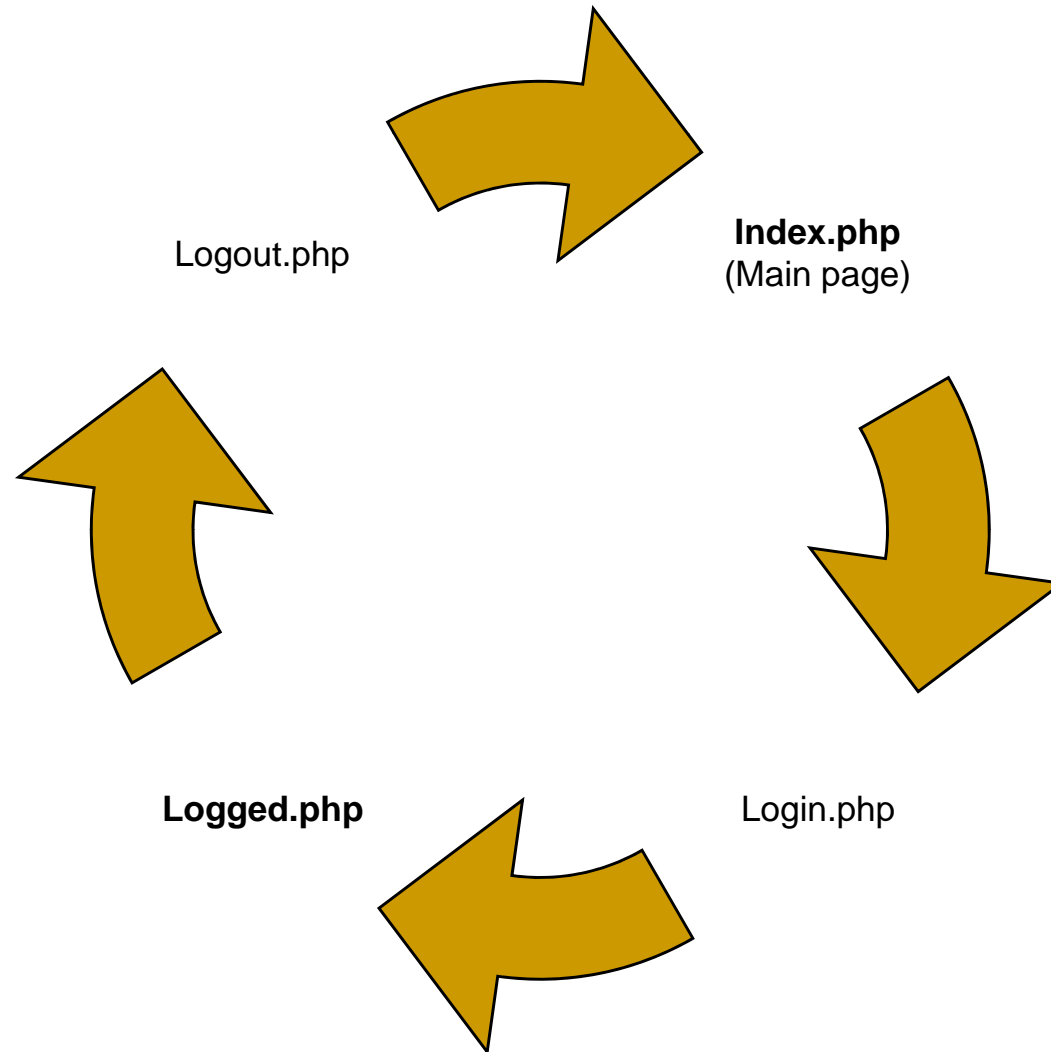
Login Information
(Login ID, email,
Name, agency,
Address)

Agency Information
(Sub agencies
According to agency
Type)

Indiana Water Monitoring Info

Field	Description	Field	Description
Agency	Agency name	Higher Agency	Super Agency
Name	Dataset name	Quality	Data quality info availability
Site_no	Site number	Contact	Contact URL
Address	The location of data	Latitude	Latitude of coordinate (WGS 1984)
ParType	Parameter type (Flow, GW level, and etc)	longitude	Longitude of coordinate (WGS 1984)
Parameter	Parameters measured	User_info	User Account
Frequency	Monitoring frequency	HUC12	Hydrologic Unit Code
Public	Public availability	HUC10	Hydrologic Unit Code
Earliest	Date of record starting	HUC08	Hydrologic Unit Code
Latest	Date of record finishing	Id	Point id

Programming Overview



Embedding GoogleMaps

- `<script src='http://maps.google.com/maps?file=api&v=2&key=xxxxx' type='text/javascript'></script>`

- Getting Key: <http://code.google.com/apis/maps/signup.html>

```
function load() {if (GBrowserIsCompatible()) {  
    var map = new GMap2(document.getElementById('map'));  
    map.addMapType(G_PHYSICAL_MAP);  
    map.addControl(new GLargeMapControl());  
    map.addControl(new GHierarchicalMapTypeControl());  
    map.addControl(new GScaleControl());
```

- Inside HTML;`<div id='map' style=' height: 600px'></div>`

Index.php

■ Connecting to database & sending query

```
$md =mysql_connect(server,id,password)
mysql_select_db(database, $md);
$query = "SELECT
Name,latitude,longitude, ...
FROM table WHERE Name LIKE'%" .
$_GET["variable_1"]."% ' AND
latitude=$_GET['variable2] AND
longitude=$_GET["variable_3"]...;

$result = mysql_query($query) or die();
while($row=mysql_fetch_row($result)){
$name[$i]=$row[0]; $latitude[$i]=$row[1];
$longitude[$i]=$row[2];
$agency[$i]=$row[3];
.....}
```

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<input type="checkbox"/> Bacteriology/Microbiology	<input type="checkbox"/> Macroinvertebrates
<input type="checkbox"/> Fish	<input type="checkbox"/> Metals
<input type="checkbox"/> Flow/Stage	<input type="checkbox"/> Nutrients
<input type="checkbox"/> General Chemistry	<input type="checkbox"/> Organics/Pesticides
<input type="checkbox"/> Groundwater Level	<input type="checkbox"/> Radiological
<input type="checkbox"/> Groundwater Quality	

4. Hydrologic Unit Code :

HUC08 HUC10 HUC12

Passing PHP Variable to Javascript

- `var point = new GLatLng('.$lat[$j].', '.$lon[$j].');`
 - `map.addOverlay(createMarker(point, ".$agency[$j].", ".$agency_type[$j].", ".$name[$j].", "...));`
 - `function createMarker(point, Agency, agency_type, name,...) {
var icon = new GIcon(baselcon);
if (index==0){icon.image = "red.png";}
else if (index==1){icon.image = "blue.png";}
var marker = new GMarker(point,icon);`
-

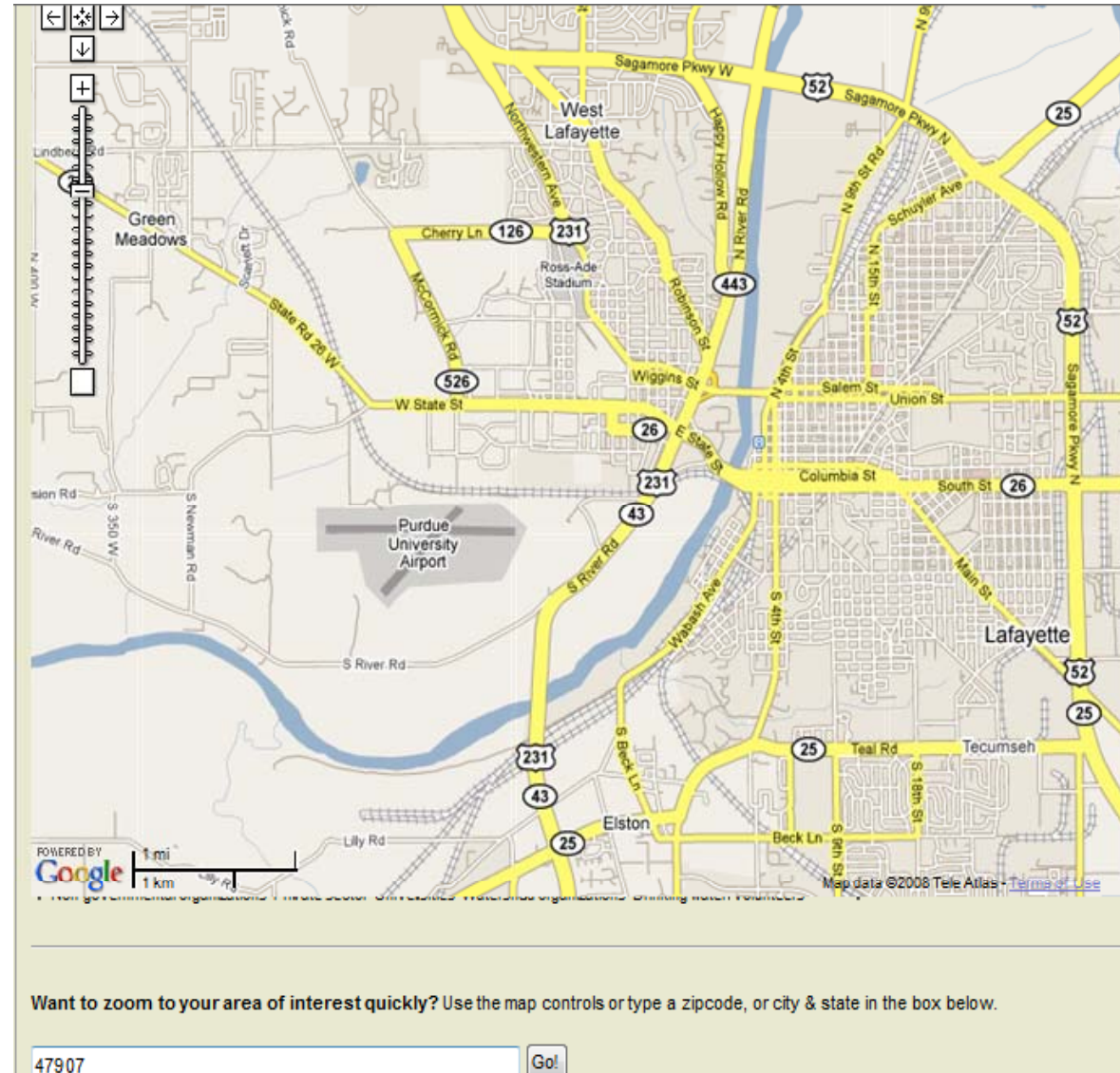
Displaying Information

Agency: The Nature Conservancy
Dataset: Darter Surveys
Location: West Branch of Mosquito Creek
Site #:
Parameter(s) sampled: community bioassessment
Parameter Type: Fish, Macroinvertebrates
Monitoring Frequency: triennial
Publicly Available?: No
Data Quality Information: The Nature Conservancy
Date of record: 2007 to On-going
HUC12: 051401040101
For more information:
<http://www.nature.org/wherewework/northamerica/states/in>

Agency: The Nature Conservancy
Dataset: Blue River Project Water Quality Monitoring

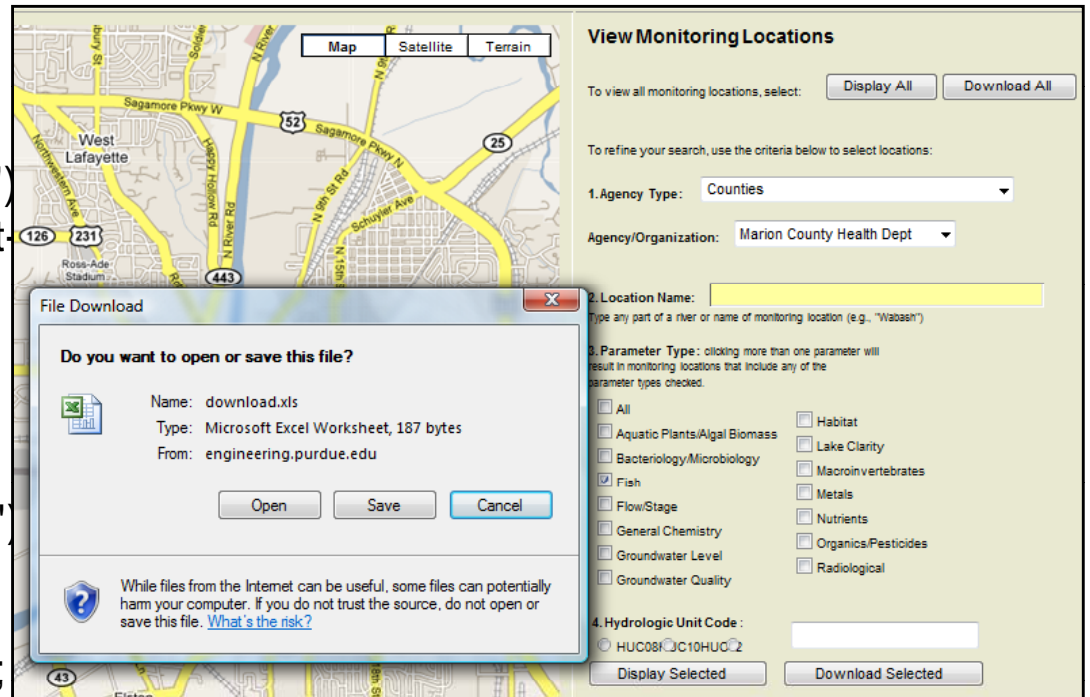
Geocoder

```
geocoder = new
  GClientGeocoder();
function showAddress(address)
{
  if (geocoder) {
    geocoder.getLatLng(address,
  function(point) {
    if (!point) { alert(address + '
    not found');}
    else {map.setCenter(point,
    13); }} );}
}
```



Downloading spreadsheet data

```
if ($_GET["down"]=='Yes' or  
    $_GET["down_all"]=='Yes')  
{ $filename = 'download.xls';  
  header("Pragma: public");header("Expires: 0")  
  header("Cache-Control: must-revalidate, post-  
    check=0, pre-check=0");  
  header("Content-Type: application/force-  
    download");  
  header("Content-Type: application/octet-  
    stream");  
  header("Content-Type: application/download");  
  header("Content-Disposition: attachment;  
    filename=".basename($file).");");  
  header("Content-Transfer-Encoding: binary");  
  header("Content-Length: ".filesize($file));  
  
  readfile($filename);}
```



Login.php

- Create Session variable for loginID
`session_start(); // start the session`
`header("Cache-control: private");`
`$_SESSION["name"] = $login_id;`
`header("location: logged.php");`
 - Data holders manage their data by themselves
-

Logged.php

- Loads data to database

- SQL statement

```
$query = "INSERT INTO table  
(column1, column2, ... ) VALUES  
('".$_GET["parameter1"]."',  
".$_GET["parameter2"], ...);"
```

Enter Monitoring Locations

Enter location information. Click the monitoring location on the map to fill in latitude and longitude. Click "Submit" to display the location on the map. The form will remain populated to reduce effort needed to enter multiple sites.

Higher agency/Organization:

Agency/Organization:

Name of Dataset:

Contact URL:

Data available to public: Yes

(Note: Locations may be useful to others even if data are not public.)

Data available to public: Yes

Parameter Type:

<input type="checkbox"/> Aquatic Plants/Algal Biomass	<input type="checkbox"/> Habitat
<input type="checkbox"/> Bacteriology/Microbiology	<input type="checkbox"/> Lake Clarity
<input type="checkbox"/> Fish	<input type="checkbox"/> Macroinvertebrates
<input type="checkbox"/> Flow/Stage	<input type="checkbox"/> Metals
<input type="checkbox"/> General Chemistry	<input type="checkbox"/> Nutrients
<input type="checkbox"/> Groundwater Level	<input type="checkbox"/> Organics/Pesticides
<input type="checkbox"/> Groundwater Quality	<input type="checkbox"/> Radiological

Parameter:

(Optional: Additional detail on parameters collected)

Name of Location:

Site Number:

Latitude(00.00):

Longitude(00.00):

Start of Data Record (Year):

End of Data Record (Year):

Monitoring Frequency:

12-digit Hydrologic Unit Code (HUC12): (req.

Editing Data

- Edit

\$query = " **UPDATE** table **SET** column="."\$_GET[variable]." ...

WHERE

ID="."\$_GET['variable_ID']." and user="."\$_SESSION['variable_session'].""

- Delete

\$query = " **DELETE FROM** table

WHERE

ID="."\$_GET['variable_ID']." and user="."\$_SESSION['variable_session'].""

Agency: Purdue University
Dataset: Test
Location: Test
Site #: 9999
Parameter(s) sampled: Test
Parameter Type: Aquatic Plants/Algal Biomass, Fish, General Chemistry
Monitoring Frequency: Continuous
Publicly Available?: Yes
Data Quality Information?: Yes
Date of record: 2000 to 2009
HUC12: 012345678901
For more information: <http://engineering.purdue.edu>
edit delete

Conclusion

- Indiana water monitoring inventory was created by Googlemaps API, Javascripts, PHP and Mysql
 - Water monitoring information from variety of sources are stored
 - User can find the water monitoring information conveniently by GUI
 - Data holders can upload, edit and delete information
 - User can download the information as text based file
-