



Introduction to GeoServer

Tutorial ID: IGET_WEBGIS_003



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Introduction to GeoServer

Objective: In this tutorial we will learn about the GeoServer GUI and how to create the workspaces, stores, publishing, styling and grouping the layers.

Software: OpenGeo Suite 3.0

Level: Beginner

Time required: 4 hours

Prerequisites and Geospatial Skills:

- Basic computer skills
- IGET_WEBGIS_001 and IGET_WEBGIS_002 should be completed

Readings

Introduction to the OpenGeo Suite, Chapter 3: GeoServer, pp. 39 – 78.

http://presentations.opengeo.org/2012_FOSSGIS/suiteintro.pdf

Tutorial Data: The tutorial data of this exercise may be downloaded from the associated folder

Introduction

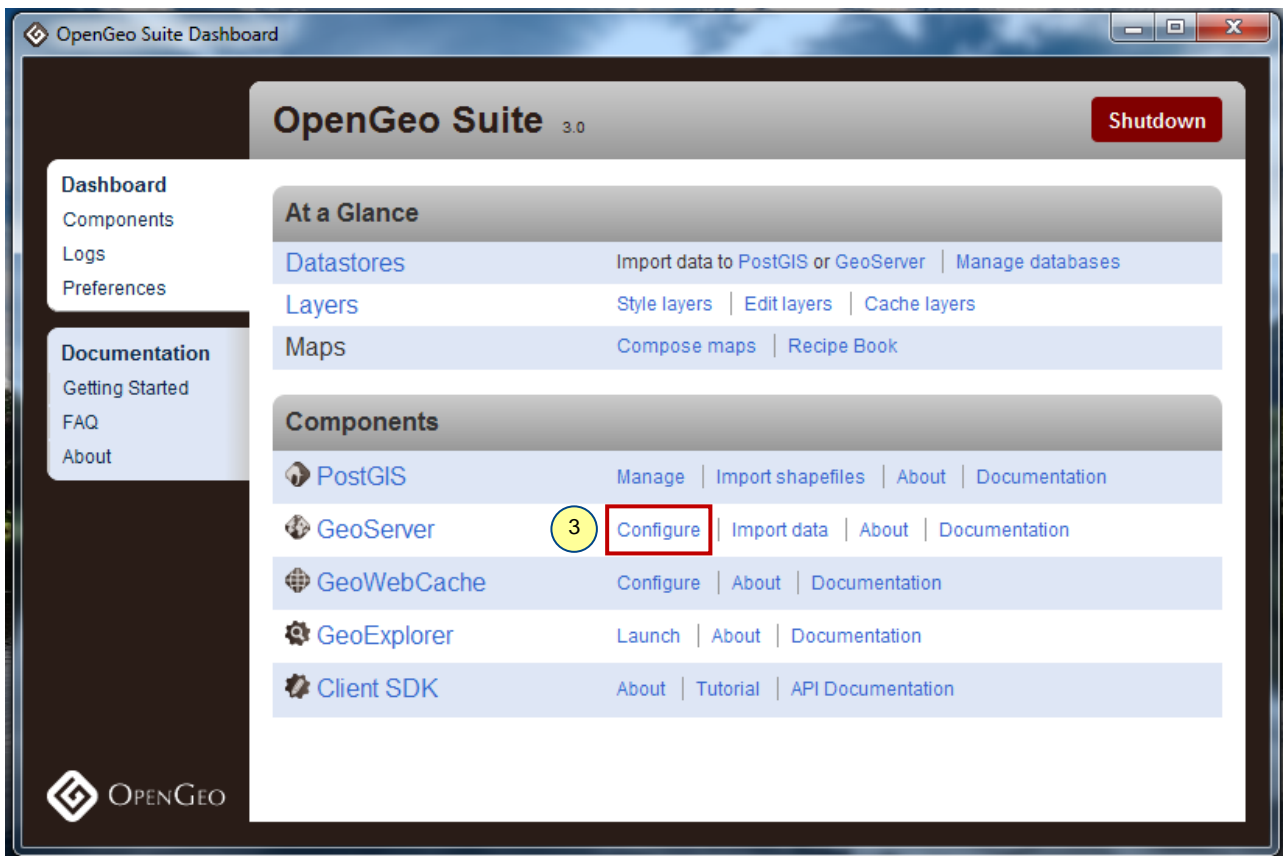
GeoServer is an open source web mapping server written in Java platform. It is a subset of a web server model specially designed to share and publishes the Geographical information over the internet. It utilizes *Web Mapping Service (WMS)*, *Web Feature Service (WFS)*, *Web Coverage Service (WCS)* and many other open protocols for transfer the Geographical information, such as maps, spatial attributes and Feature data sets. Through these protocols *GeoServer* can serve the data and maps in an efficient and powerful way. *GeoServer* supports the most common data sources like, Geo Tiff, Shapefile, ArcGrid, JPEG200 and GDAL formats and various databases viz., PostGIS, SQL Server, DB2, Oracle Spatial and ArcSDE.

You are recommended to read the *GeoServer* concepts before proceeding to the exercise from following link:

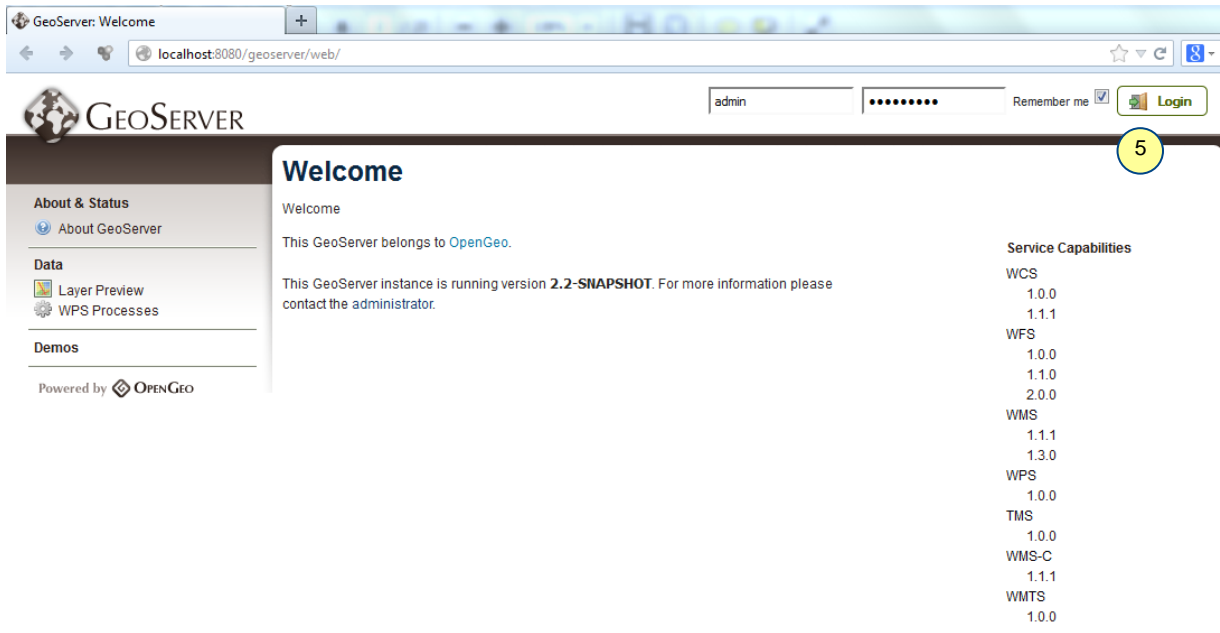
<http://workshops.opengeo.org/suiteintro/geoserver/concepts.html>

GeoServer Graphic User Interface (GUI)

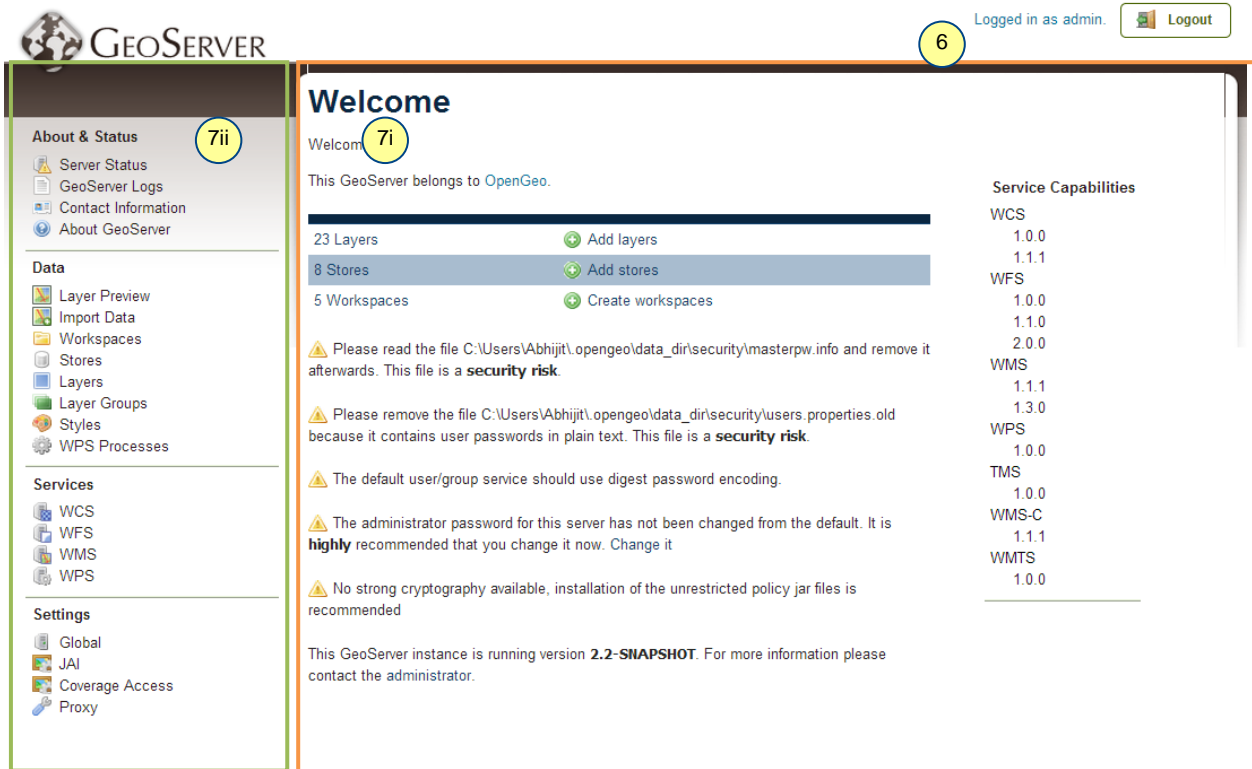
1. Start OpenGeo Suite Dashboard via, *Start* → *All Programs* → *OpenGeo Suite 3.0* → *OpenGeo Suite Dashboard*.
2. In OpenGeo Suite Dashboard click on ‘*Start*’ button to start the server.
3. Click on the ‘*Configure*’ button in *GeoServer* column



4. Now ‘*GeoServer: Welcome*’ page will be opened in your default web browser.
5. You need to fill your credentials to login into the *GeoServer* to carry out the configuration tasks. By default the user name and password is ‘*admin*’ and ‘*geoserver*’. After filling the credentials click on ‘*Login*’ button.



6. After successful login, you can notice more options appeared in the *GeoServer: Welcome* window.



7. The GUI of the *GeoServer: Welcome* window is divided into 2 main parts

- i. **Main Panel** (shown in the orange box): It contains the information that corresponds to the selected option from the navigation panel.
- ii. **Navigation Panel** (shown in the green box): Navigation panel is further grouped into following groups.
 - a. About & Status
 - b. Data
 - c. Services
 - d. Settings
 - e. Tile Caching
 - f. Security
 - g. Scripting
 - h. Demos
 - i. Tools

We will learn each of the above the groups in detail as we move further

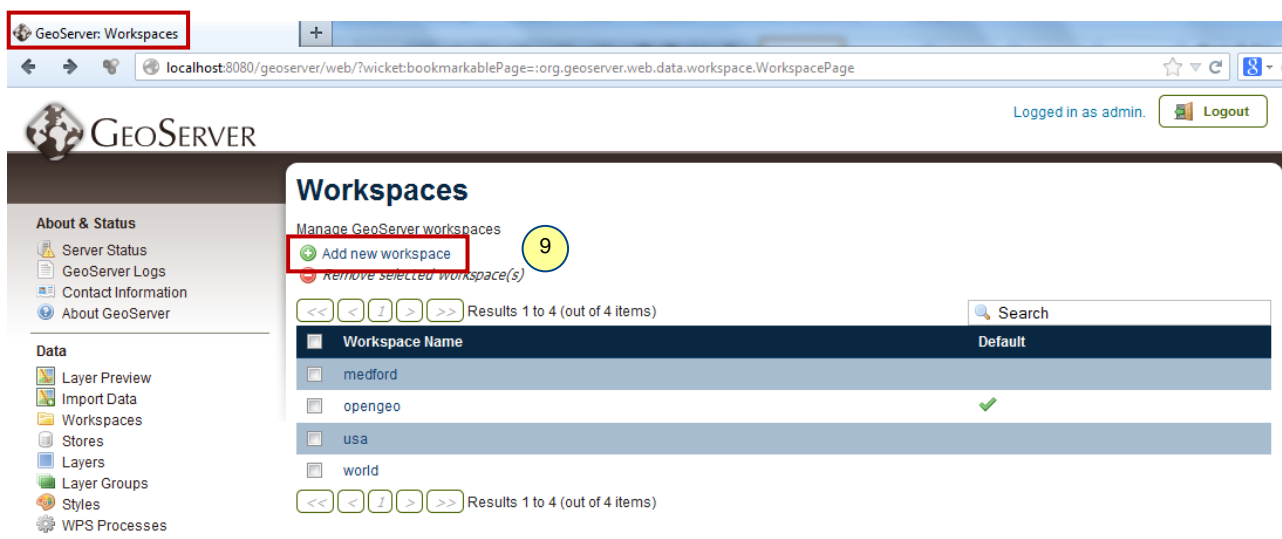
Creating a workspace

A **workspace** is the name for a notional container used to group similar data together. A workspace consists of a Name and a Namespace URI (*Uniform Resource Identifier*). The workspace name should not contain any spaces.

8. In the navigation panel of 'GeoServer: Welcome' page, click on '**Workspaces**'



9. Now you will be redirect to the 'GeoServer: Workspaces' page. In order to create a workspace, click on '**Add new workspace**' under Workspace in *Main Panel*.



10. Now you will redirect to 'GeoServer: New workspace' page. Here we have to specify the **Name** and **Name Space URI**, enter 'BVU_Vector_wp' and 'BVU_vector_wp' respectively in Name and Namespace URI, click on '**Submit**' button.

10

New Workspace

Configure a new workspace

Name

Namespace URI

 The namespace uri associated with this workspace

Default Workspace

11. You will redirect back to the 'GeoServer: Workspaces' page, under *Workspaces* name you can see the newly added 'BVU_Vector_wp' Workspace in the last step.

11

Workspaces

Manage GeoServer workspaces

<< < | > >> Results 1 to 5 (out of 5 items)

<input type="checkbox"/>	Workspace Name	Default
<input type="checkbox"/>	BVU_Vector_wp	
<input type="checkbox"/>	medford	<input checked="" type="checkbox"/>

12. If you want to delete any Workspace, check the 'Check box' left side to the 'Workspace Name' you want to delete, now you will notice, 'Remove selected Workspace(s)' will be enabled, click over it. Then you will present with 'Confirm Object removal' window, Click 'OK' to delete the workspace.

Creating a Stores

"A store is the name for container of Geographic data (opengeo.org)". In this tutorial we will learn how to connect to the PostGIS database that we created in *IGET_WEBGIS_002: PostGIS*, i.e., 'BVU_IEER_DB'.

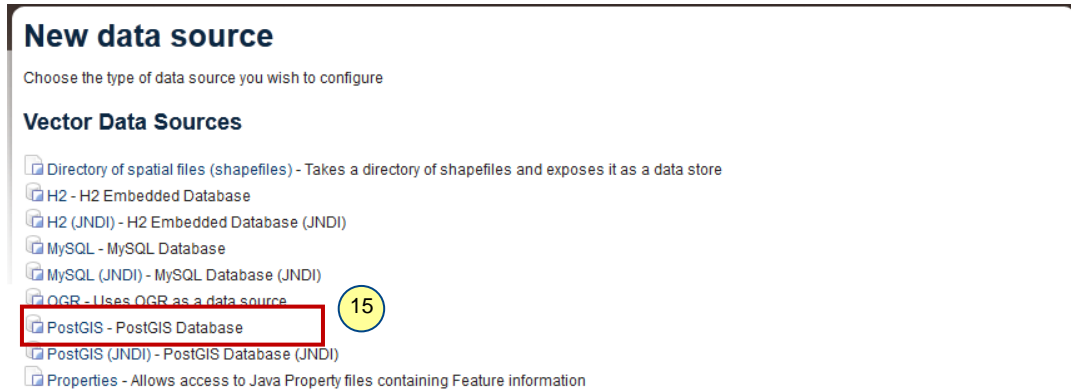
13. Click on the 'Stores' in navigation panel of the *GeoServer* Window page.

13

14. Now you will be redirect to the 'GeoServer: Stores' page. Click on 'Add new store', then you will redirect

to the ‘GeoServer: New data source’ page.

15. Select ‘**PostGIS**’ under ‘**Vector Data Sources**’



16. You will present with a form, where you have to fill the basic information to connect our PostGIS database created in *IGET_WEBGIS_002*. Select ‘**BVU_vector_wp**’ from down drop list under *Workspace*, enter *Data Source Name* as ‘**BVU_Vectot_st**’, ‘*Description*’ as ‘**Vector files of BVU toposheet**’ and Make sure check box of ‘**Enabled**’ is checked.

Basic Store Info

Workspace *

BVU_Vector_wp

Data Source Name *

BVU_Vectot_st

Description

Vector files of BVU toposheet

Enabled

17. Go to the ‘**Connection Parameters**’ section, type ‘**54321**’ under ‘**port**’, ‘**BVU_IEER_DB**’ under ‘**database**’ and enter ‘**postgres**’ as username and also as password under ‘**user**’ and ‘**password**’ fields. Leave all other fields as default and click on ‘**Save**’.

17

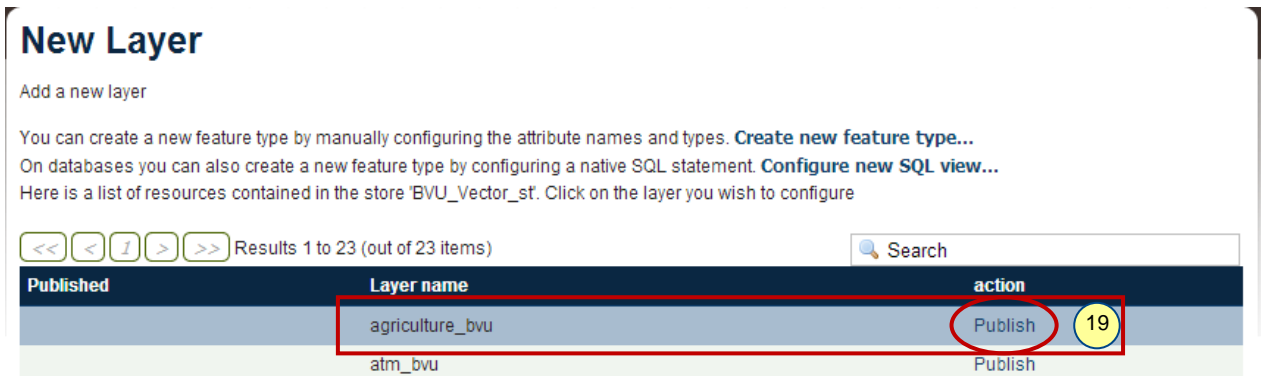
Connection Parameters

host *	localhost
port *	54321
database	BVU_IEER_DB
schema	public
user *	postgres
passwd	*****
Namespace *	BVU_vector_wp
<input type="checkbox"/> Expose primary keys	
max connections	10
min connections	1
fetch size	1000
Connection timeout	20
<input checked="" type="checkbox"/> validate connections	
Primary key metadata table	
Session startup SQL	
Session close-up SQL	
<input checked="" type="checkbox"/> Loose bbox	
<input checked="" type="checkbox"/> Estimated extends	
<input type="checkbox"/> preparedStatements	
Max open prepared statements	50
<input type="checkbox"/> encode functions	
Save	Cancel

18. If the credentials are correct, then you will see the list of the resource/tables contained in the store 'BVU_Vector_st'. If you were not successful, please check the credentials from the IGET_WEBGIS_002.

Publishing a layer

19. To publish a (single) layer click on the '**Publish**' button, this is located against to the desired layer to be published under '**action**' field. For example: if you want publish '*agriculture_bvu*' click on publish against to it, under '**action**' field here.



New Layer

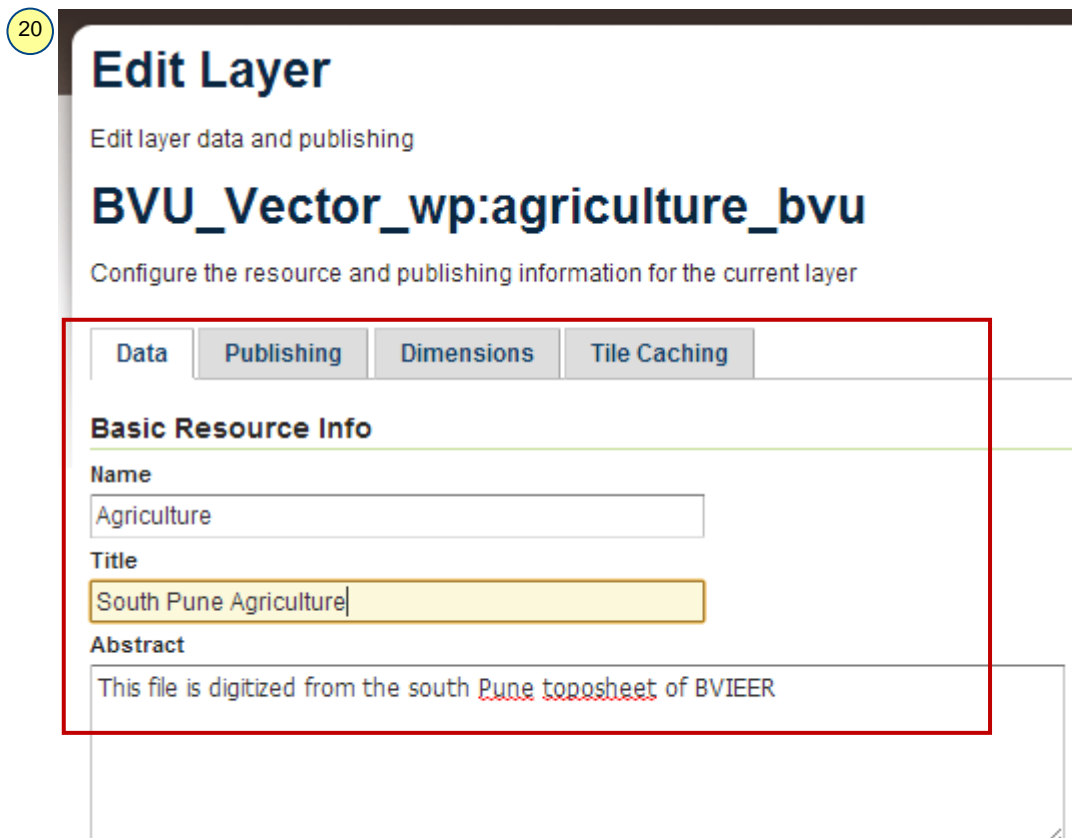
Add a new layer

You can create a new feature type by manually configuring the attribute names and types. [Create new feature type...](#)
 On databases you can also create a new feature type by configuring a native SQL statement. [Configure new SQL view...](#)
 Here is a list of resources contained in the store 'BVU_Vector_sf'. Click on the layer you wish to configure

<< < | > >> Results 1 to 23 (out of 23 items)

Published	Layer name	action
	agriculture_bvu	Publish
	atm_bvu	Publish

20. Now you will redirect to the '*Edit Layer*' page, here we have to configure the layer for publishing. Change the '**Basic Resource info**' under '**Data**' tab as shown below.



Edit Layer

Edit layer data and publishing

BVU_Vector_wp:agriculture_bvu

Configure the resource and publishing information for the current layer

Data Publishing Dimensions Tile Caching

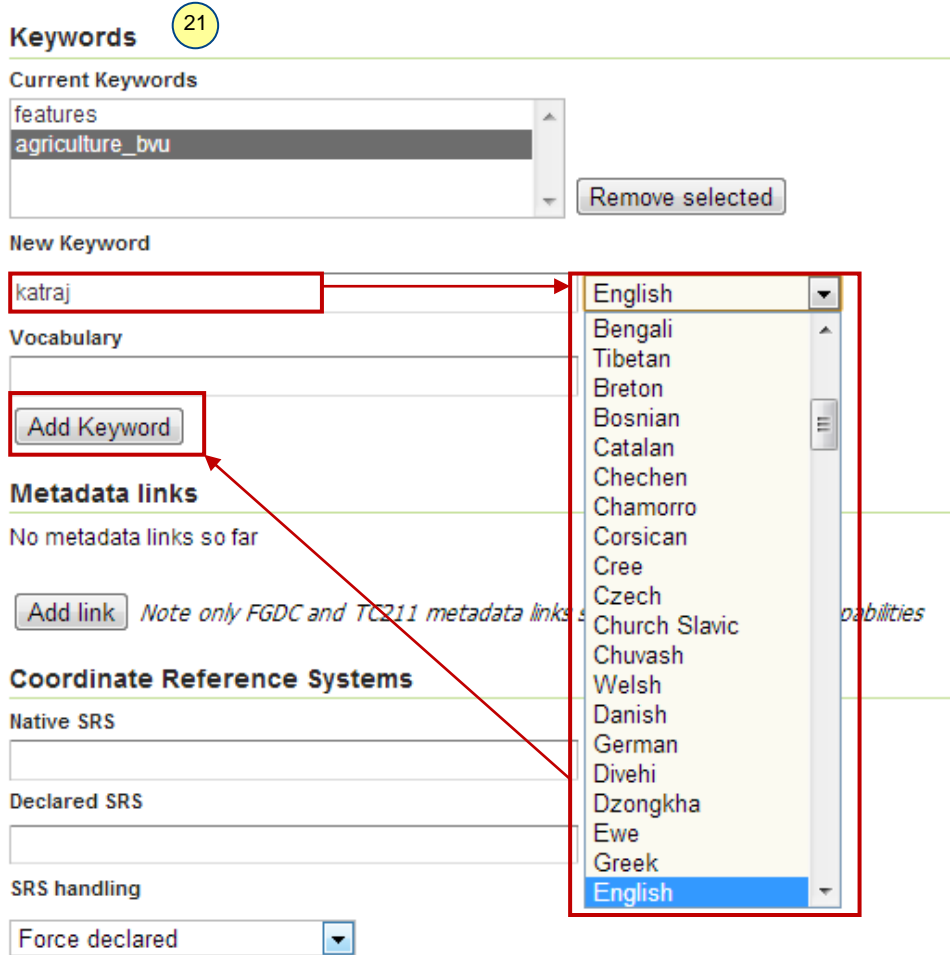
Basic Resource Info

Name
Agriculture

Title
South Pune Agriculture

Abstract
This file is digitized from the south Pune toposheet of BVIEER

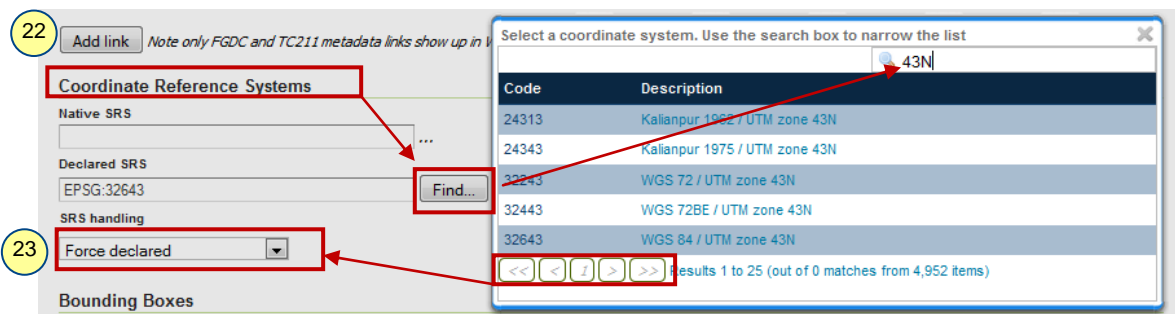
21. Go to the '**New Keyword**' text box, add the relevant keywords, Keywords makes the layers and information easily searchable on server. In our case, the toposheet belongs to *Katra area of Pune city*. So we are adding these two keywords now. To add keyword, type '**Katraj**' in '**New keyword**' text box → Select the language as '**English**' from the down drop list located right side to the text box → Click on '**Add Keyword**' button to add the key word. Similar add the keyword '**Pune**'.



22. Go to the ‘*Coordinate Reference System*’ section, here we have to specify the coordinate system of our layer i.e., ‘*UTM 43N based on WGS84 Datum*’, Type its code: **EPSG:32643** in the ‘*Declared SRS*’.

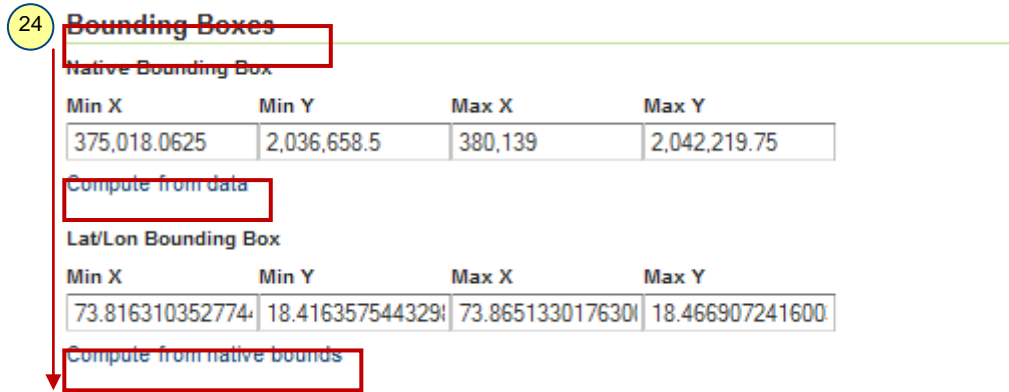
OR

If you don’t know the *SRS ID*, then click on ‘*Find*’ button then you will see a popup window → in the popup window type ‘*43N*’ in the *search box* → Press ‘*Enter*’ → Now you will be presented with a number of results, Select ‘*WGS84/ UTM zone 43 N*’, by clicking on code number ‘*32643*’.



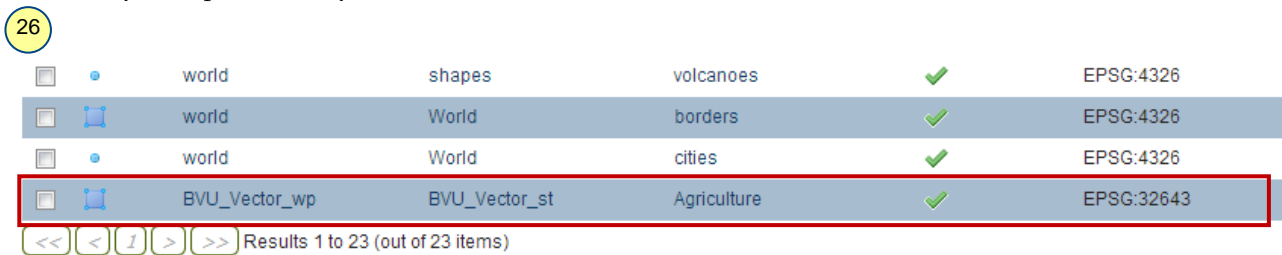
23. Now select ‘*Force declared*’ from the down drop list under ‘*SRS handling*’

24. Now go to the Bounding Boxes Section, Here we have to specify the bounding box extent. To do this click on ‘*Compute from data*’ under ‘*Native Bounding Box*’ and ‘*Compute from native bounds*’ under ‘*Lat/Long Bounding Box*’. Now you will notice the extent values in the corresponding text boxes.



25. Click on  'Save' in the 'Edit layer' Page

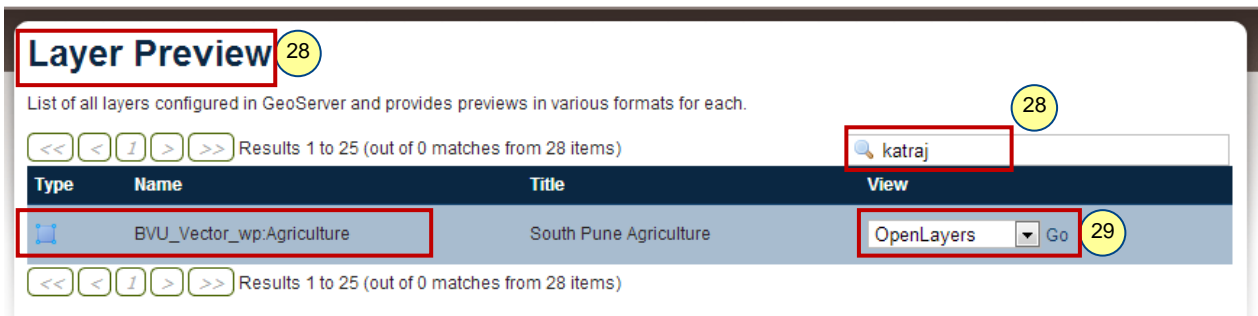
26. Now you will redirect to the 'Layers' page → where you can see the 'Agriculture' layer under the list of layers of published layers.



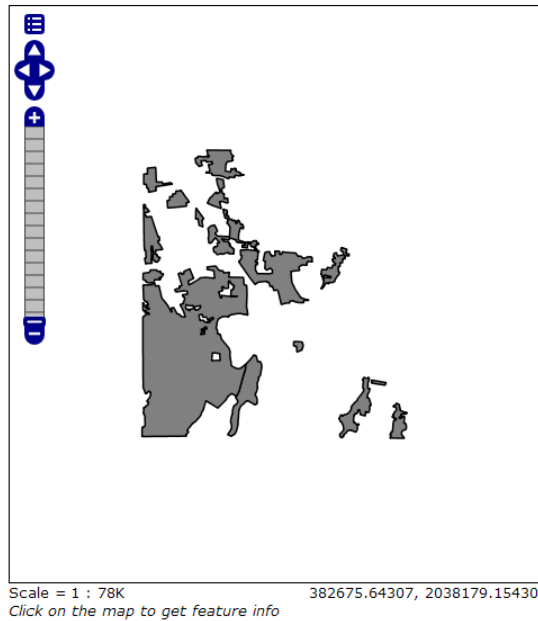
27. We published the 'Agriculture' layer successfully; it is time to preview our work. To do this click on 'Layer Preview' under 'Data' section.



28. Now you will redirect to the 'Layer Preview' page, in this page you will be presented with all available published layers → Navigate to the 'BVU_Vector_wp: Agriculture' layer that we published earlier. You can search the layer using the keyword we added, type 'Katraj' in search box, press 'Enter' in keyboard.



29. Now select ‘OpenLayers’ from the down drop list against to the ‘BVU_Vector_wp:Agriculture’ → click on ‘Go’ → ‘Agriculture’ layer will be published in a new browser window as shown below.

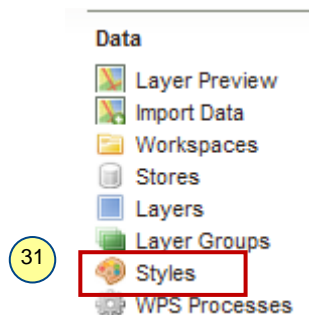


30. Similarly Publish all other layer in the store before proceeding further.

Styling Layer

We published the agriculture layer and would like to style the layer for better visualization purpose. This is necessary step because there is no implicit symbology exists within the geospatial data.

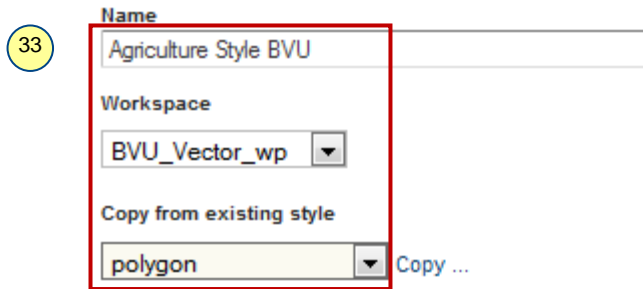
31. To style the agriculture layer, click on ‘Styles’ under ‘Data’ section in the navigation panel.



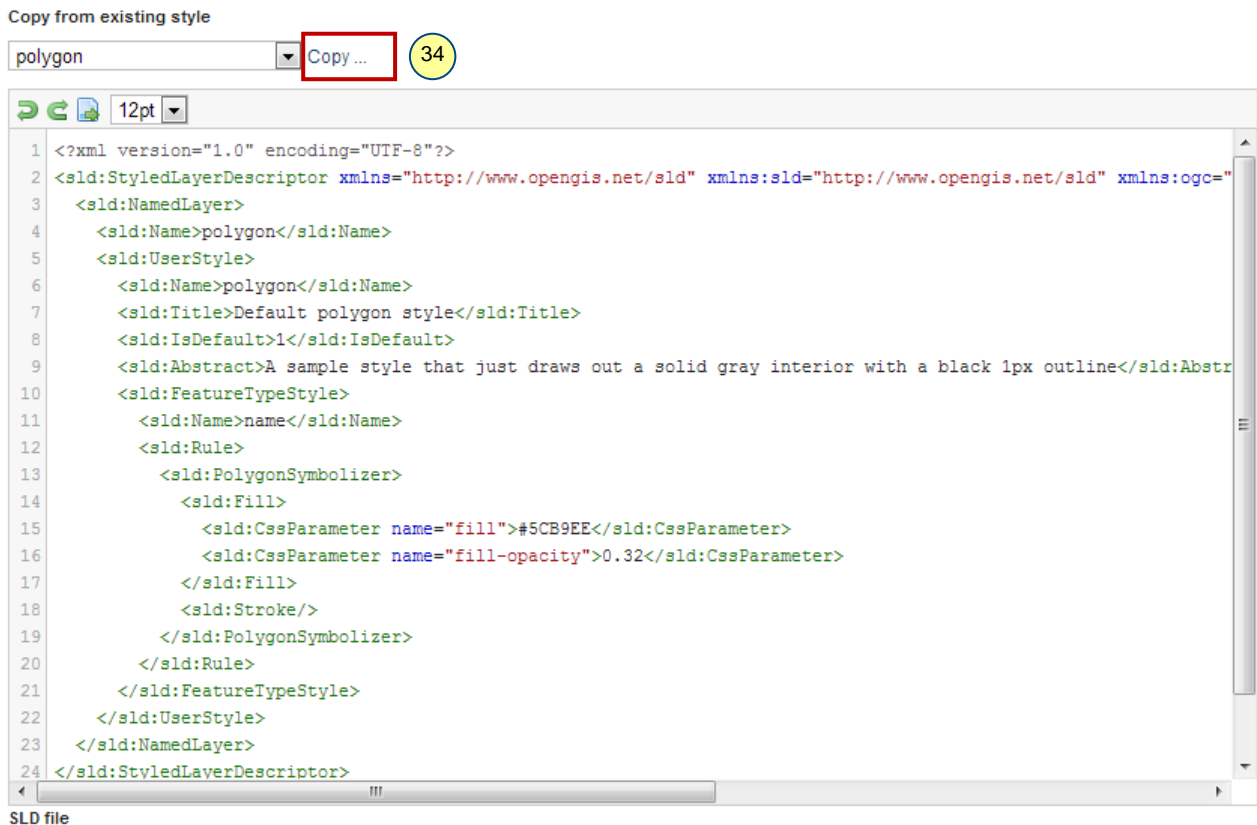
32. Now you will be redirect to the ‘GeoServer: Styles’ page. Click on ‘Add a new style’, then you will redirect to the ‘GeoServer: New style’ page.



- 33. Now name the style as ‘Agruculture Style BVU’ select ‘BVU_Vector_wp’ from workspace dropdown and select **polygon** from copy from existing style dropdown



- 34. Now click on ‘copy’, you will notice the text box below is filled with an xml code as show below. It is known as ‘*Styled Layer Descriptor (SLD)*’, an xml file based on the OGC specified format that is used to describe the symbol of features. To know more about the SLD please visit <http://www.opengeospatial.org/standards/sld>



- 35. Now edit the this Code as per our requirements, we have to edit *Name*, *Title* and *CssParemeter* as shown in the below figure. The color codes are in hexadecimal format

35

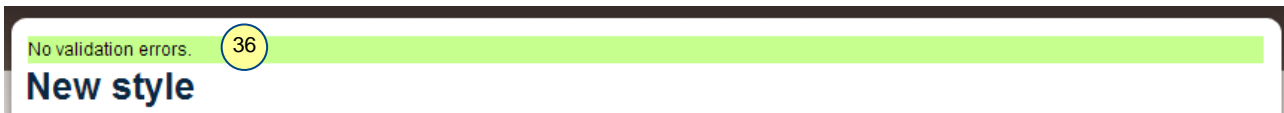
```

1 <?xml version="1.0" encoding="ISO-8859-1"?>
2 <StyledLayerDescriptor version="1.0.0" xmlns="http://www.opengis.net/sld" xmlns:ogc="http://www.opengis.net/ogc"
3   xmlns:xlink="http://www.w3.org/1999/xlink" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
4   xsi:schemaLocation="http://www.opengis.net/sld http://schemas.opengis.net/sld/1.0.0/StyledLayerDescriptor.xsd">
5   <NamedLayer>
6     <Name>Agriculture style BVU</Name>
7     <UserStyle>
8       <Title>Agriculture BVU</Title>
9       <Abstract>A style that just draws out a solid green interior with a dark green 1px outline</Abstract>
10      <FeatureTypeStyle>
11        <Rule>
12          <Title>Agriclure BVU</Title>
13          <PolygonSymbolizer>
14            <Fill>
15              <CssParameter name="fill" value="#00FF00"/>
16              <CssParameter name="fill-opacity" value="0.26"/>
17            </Fill>
18            <Stroke>
19              <CssParameter name="stroke" value="#009900"/>
20              <CssParameter name="stroke-width" value="1"/>
21            </Stroke>
22          </PolygonSymbolizer>

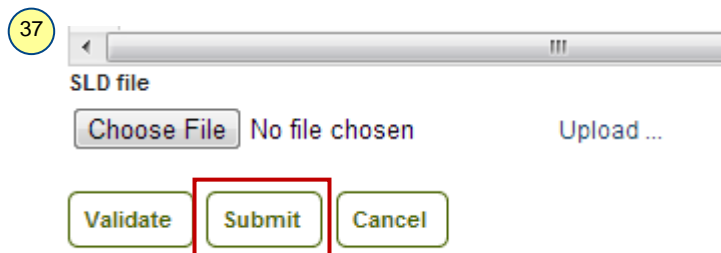
```

Hexadecimal Color code

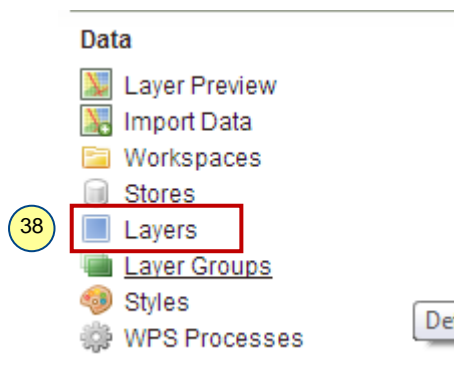
36. Now validate the xml code by clicking on the validate button at bottom of the page. If there are no errors, you can see ‘No Validation errors’ message on screen similar to the image below.



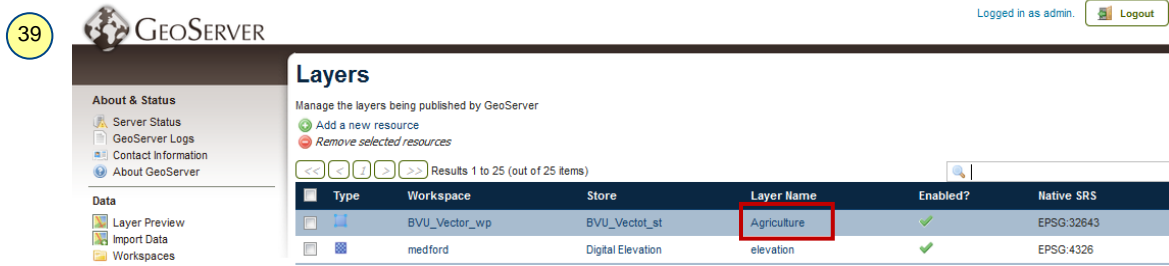
37. Now click ‘Submit’ button, you will be redirected to *GeoServer: Styles* page.



38. To assign this style to any polygon layer click on ‘Layers’ in Navigation panel.




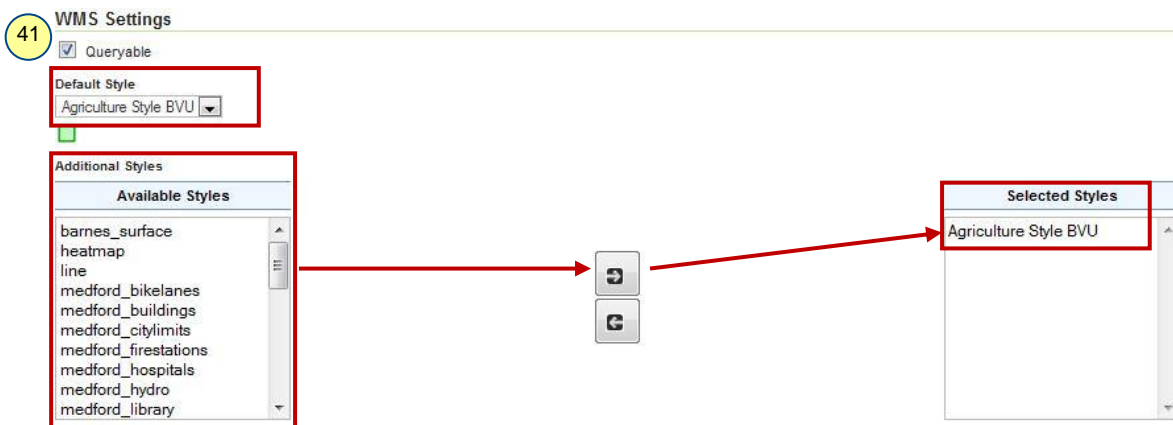
39. Now you will redirect to the ‘GeoServer: Layers’ page. Now click on ‘Agriculture’ layer of *BVU_Vector_wp* under ‘Layer Name’ section.



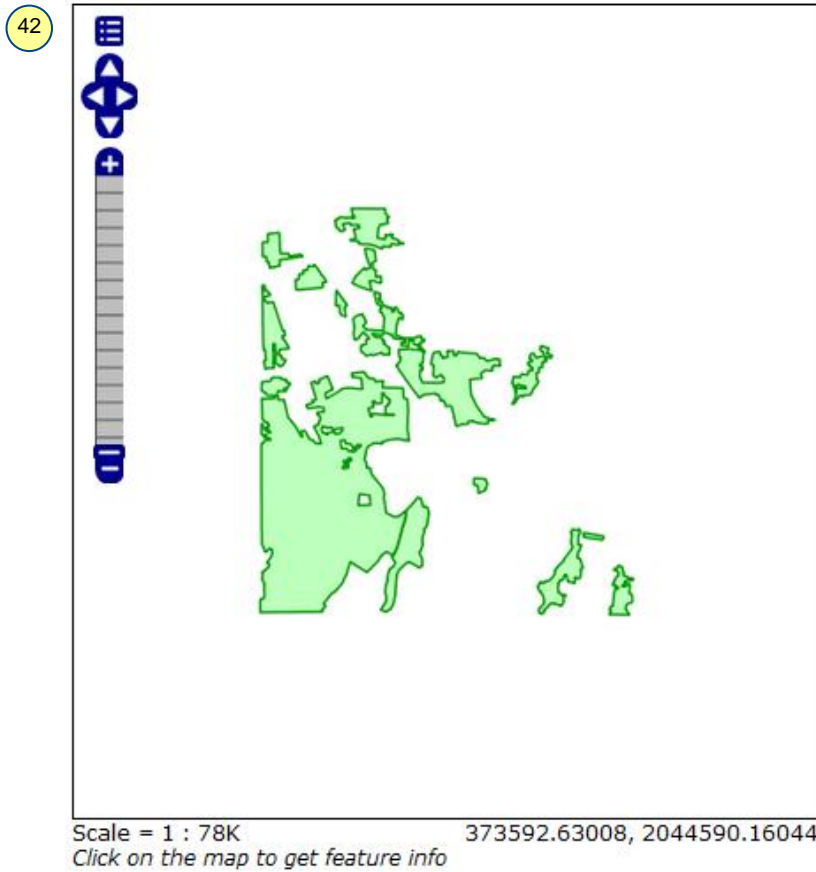
40. Now click on ‘**Publishing**’ tab of *BVU_Vector_wp: Agriculture*.



41. Scroll down to **WMS settings** and select the ‘*Agriculture Style BVU*’ from the down drop list under ‘*Default Style*’. In ‘*Additional styles*’ section select ‘*Agriculture Style BVU*’ and click on the *right arrow button* , now you can see the selected style placed under ‘*Selected Styles*’ list. Scroll down to the bottom of the page and click on ‘*Save*’.



42. Now you will redirect back to the ‘*GeoServer: Layers*’ page. Now repeat steps 27 – 29 to preview the *Agriculture* layer with the style we specified in above steps.



Grouping the layers

A *Layer Group* is a collection of layers. It contains the information of individual layers and facilitates to request multiple layers through a single WMS request. It saves our time, provides easy access to the layers and makes our work smarter. In this section we will learn how to create a ‘transportation group’.

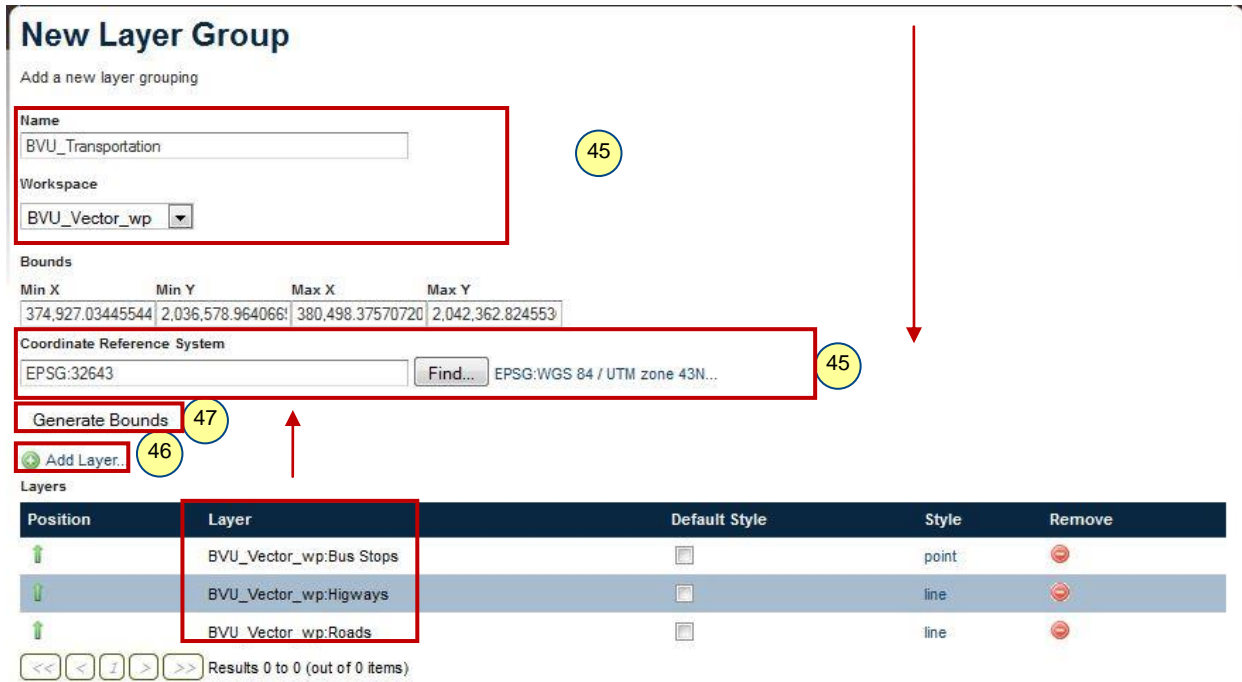
43. To create a *Layer group*, click on ‘*Layer Groups*’ under *Data* section in Navigation panel of *GeoServer* page.



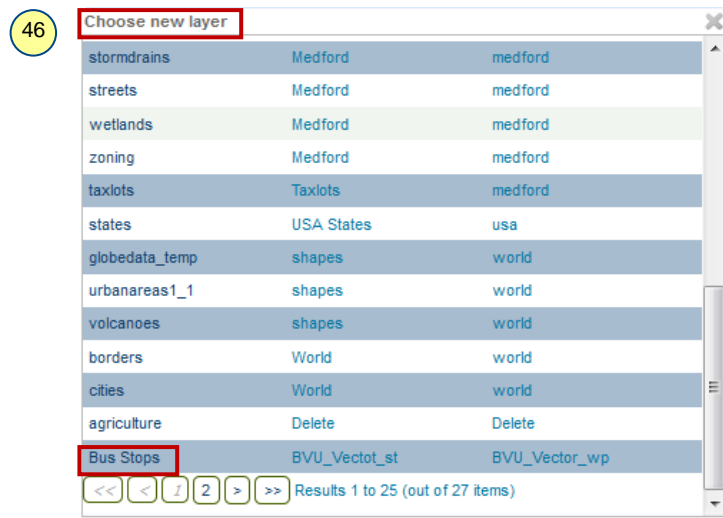
44. Now we will direct to ‘*GeoServer: Layer Groups*’. Click on ‘*Add new layer group*’.



45. In the ‘*New Layer Group*’ page, enter ‘*BVU_Transportation*’ as ‘*Name*’ → Select workspace as **BVU_Vector_wp**. In the Coordinate reference system use ‘*Find*’ to select ‘*EPSG:32643*’ as SRS

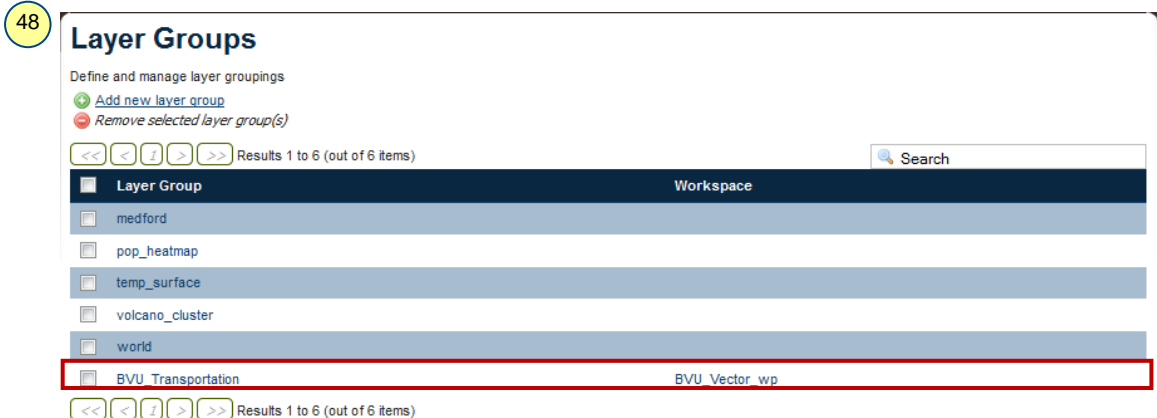


46. Click on ‘**Add Layers**’, select *Bus stops*, *Highways* and *Street Roads* layers (Published in Step 30) by clicking on their name under *Name* field in ‘*Choose new layer*’ popup window. Use remove button to remove any wrongly added layer.

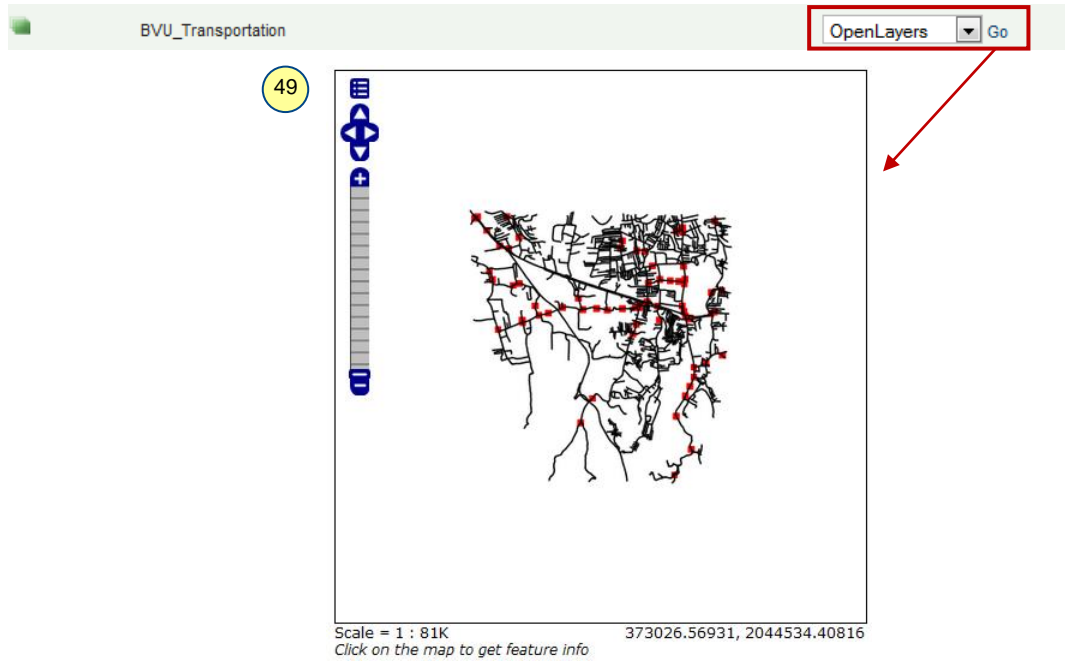


47. After adding the layers click on ‘**Generate Bounds**’ button to calculate the extent of the layer and leave all other fields default, scroll down to click on ‘**Save**’.

48. Now you will redirect to the ‘*GeoServer: Layer Groups*’ page. Where you can see newly added ‘*BVU_Transportation*’ Group in the list.



- Now click on **'Layer Preview'** in navigation panel → Now find **'BVU_Transportation'** group under **Layer Preview** list (use navigation tools , , , , , if required) → Click on **'Go'** to preview the group.

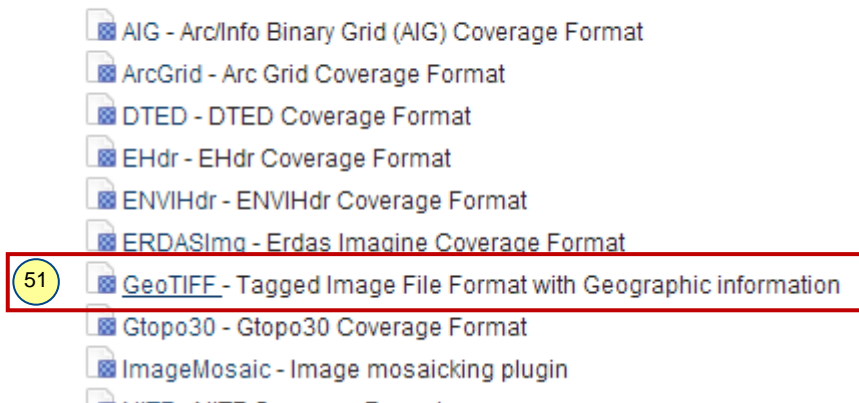


Publishing a Raster file on GeoServer

As now we have covered the vector publishing now we will see how to publish the raster data on GeoServer.

- Create a *Workspace* named **'BVU_Raster_wp'** (refer steps 8-11)
- Create a *New Store* (refer steps 13 -14) now select **'GeoTIFF'** format under **'Raster Data Sources'**

Raster Data Sources



- Name the stores as **'BVU_Raster_st'** using workspace as **'BVU_Raster_wp'** add some description that describes the data correctly the click on **'Browse'** to select the **'BVU_tiff'** from tutorial data and click on **'Save'**.

52

Add Raster Data Source

Description

GeoTIFF
Tagged Image File Format with Geographic information

Basic Store Info

Workspace *
BVU_Raster_wp

Data Source Name *
BVU_Raster_st

Description
Bharati Vidyapeeth University Satellite imagery

Enabled

Connection Parameters

URL *
file://G:\BVIEER\IGET_Tutorial\... Browse...

Save Cancel

53. A New raster layer will appear in *New Layer* page → click on **‘Publish’** in front of the *BVU_Tiff*.

New Layer

Add a new layer

Here is a list of resources contained in the store 'BVU_Raster_st'. Click on the layer you wish to configure

<< < | > >> Results 1 to 1 (out of 1 items) Search

Published	Layer name	action
53	BVU_Tiff	Publish

<< < | > >> Results 1 to 1 (out of 1 items)

54. You will direct *‘Edit Layer’* Page. Now give a proper *‘Name’*, *‘Title’* and *‘Description’* as shown below.

54

Edit Layer

Edit layer data and publishing

BVU_Raster_wp:BVU_Tiff

Configure the resource and publishing information for the current layer

Data Publishing Dimensions Tile Caching

Basic Resource Info

Name
BVU_Tiff

Title
Bharati Vidyapeeth University Sat. Image

Abstract
IGET tutorial demonstrating how to publish raster data

55. Add necessary keywords such as **‘Katraj’** and **‘Pune’** refer *Step 21*.

Keywords

Current Keywords

WCS
GeoTIFF
BVU_Tiff
Katraj
Pune

Remove selected

New Keyword

Pune

Vocabulary

Add Keyword

56. Unlike the vector data you don't have to generate the *Bounding box* and declare the *Coordinate Reference system* since *Geotiff* format includes the CRS information. If you think anything went wrong you can change the SRS. Now we are accepting it because the layer is assigned to right SRS, click on 'Save' to finish.

Coordinate Reference Systems

Native SRS

EPSG:32643 EPSG:WGS 84 / UTM zone 43N...

Declared SRS

EPSG:32643 Find... EPSG:WGS 84 / UTM zone 43N...

SRS handling

Reproject native to declared

Bounding Boxes

Native Bounding Box

Min X	Min Y	Max X	Max Y
374,955	2,036,835	380,145	2,042,235

Compute from data

Lat/Lon Bounding Box

Min X	Min Y	Max X	Max Y
73.815712243469	18.417948732898	73.865179361424	18.467045387255

Compute from native bounds

Coverage Parameters

InputTransparentColor

SUGGESTED_TILE_SIZE

512,512

56 Save Cancel

57. Now go to the 'Layer Preview' search for 'Katraj' (Note: this will work only if you have added katraj as keyword as mentioned in step 55). Navigate to 'BVU_Raster_wp: BVU_Tiff' → Click on 'Go'.

Layer Preview (57)

List of all layers configured in GeoServer and provides previews in various formats for each.

Search: katraj

Type	Name	Title	View
	BVU_Vector_wp:Agriculture	South Pune Agriculture	OpenLayers Go
	BVU_Raster_wp:BVU_Tiff	BVU_Tiff	OpenLayers Go

Results 26 to 32 (out of 0 matches from 32 items)

58. Now you can see the published ‘Satellite image covering Bharati Vidyapeeth University, along with Katraj Snake Park and Upper Katraj Lake’ in your browse window.

(58)

Scale = 1 : 75K 382612.03125, 2038649.06250
Click on the map to get feature info

Task 1: Create a styling for Water bodies and publish the layer.

Task 2: Create a styling for Roads and publish the layer.

Task 3: Create *Services* layer group by using tutorial data.