

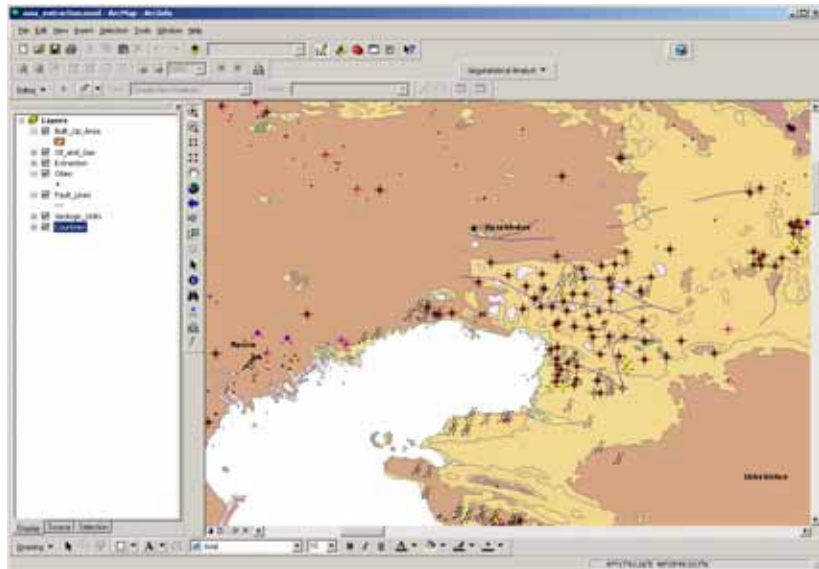
Investigating Asia's Minerals Extraction Using a Geographic Information System (GIS)

Extractive Industries

One way to understand Asia is to study its extractive industries.

Extraction refers to anything that has to be taken out of the ground. This includes oil, natural gas, gravel for construction, and minerals such as gold, copper, manganese, and many others that are used in our everyday lives. What if you

could use a Geographic Information System (GIS) and the spatial perspective to investigate Asia's time zones and the continent as a whole? Using a GIS called ArcView from ESRI (<http://www.esri.com/arcview>), you can!



Oil wells, gas wells, and mines map and data used in this investigation.

Your Mission: Using your GIS, be an investigative geographer, following the steps below en route to understanding more about the spatial pattern of extraction in South Asia.

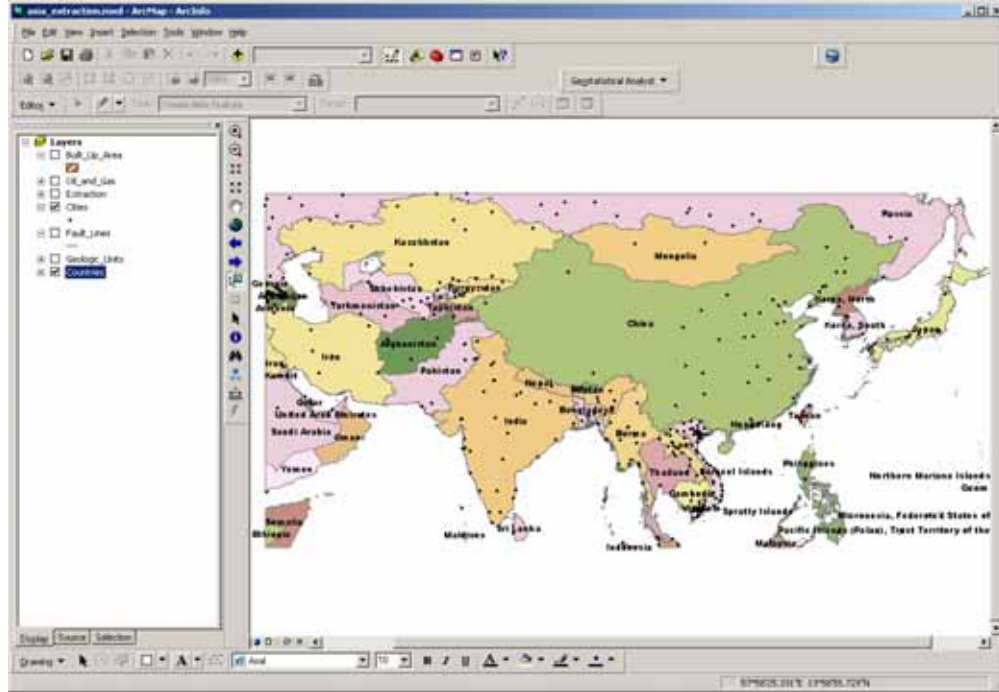
Investigating Extraction








Access ArcMap, part of ArcGIS from ESRI to begin your investigation!

Once you have accessed ArcMap, use File→ Open to open the file asia_extraction.mxd.

Your map should look similar to the map below:





Use the zoom    and pan  tools, and turn map layers on and off to answer the questions in this exercise. You may have to open attribute tables, use the Select by Attribute function, Select By Layer, the Select Feature tool , the measure tool , or Find  to answer the following questions.

- 1) In what part of Asia are you investigating?
- 2) Make three observations about the distribution of cities in South Asia.
- 3) What is the spatial relationship of cities to the “built up area”?
- 4) Based on the distribution of cities and built up area, what countries would you expect to be the most heavily populated in South Asia?
- 5) What is one danger of making a hypothesis of total population based on the cities and built up areas?
- 6) What is the relationship of demand for minerals, oil, and gas, and population?



Turn off the built up area layer and turn on the extraction layer. Expand the legend for the extraction layer.

7) Make three observations about the spatial pattern of the extraction in South Asia.

8) What effect does mining and extraction have on local employment? How do you think these industries affect the pattern and growth of towns in the area?

Access the attribute table for Extraction and summarize on the field POR.

9) Which is more common—open mining pits, or other methods of extraction (trenches and shafts)?

10) In your opinion, which method is safer for miners?

11) In your opinion, which method is less harmful to the environment?

Think about the volume of material brought to the surface from mine shafts and pits, and the need to refine the ore into a usable product, and to ship it around the world.

12) What effect does the mining extraction industry have on the density and routes of roads, highways, and pipelines?

13) Which countries would you say have the most extraction features?

14) Name three areas in South Asia where the extraction features are concentrated.

Turn on the fault lines.

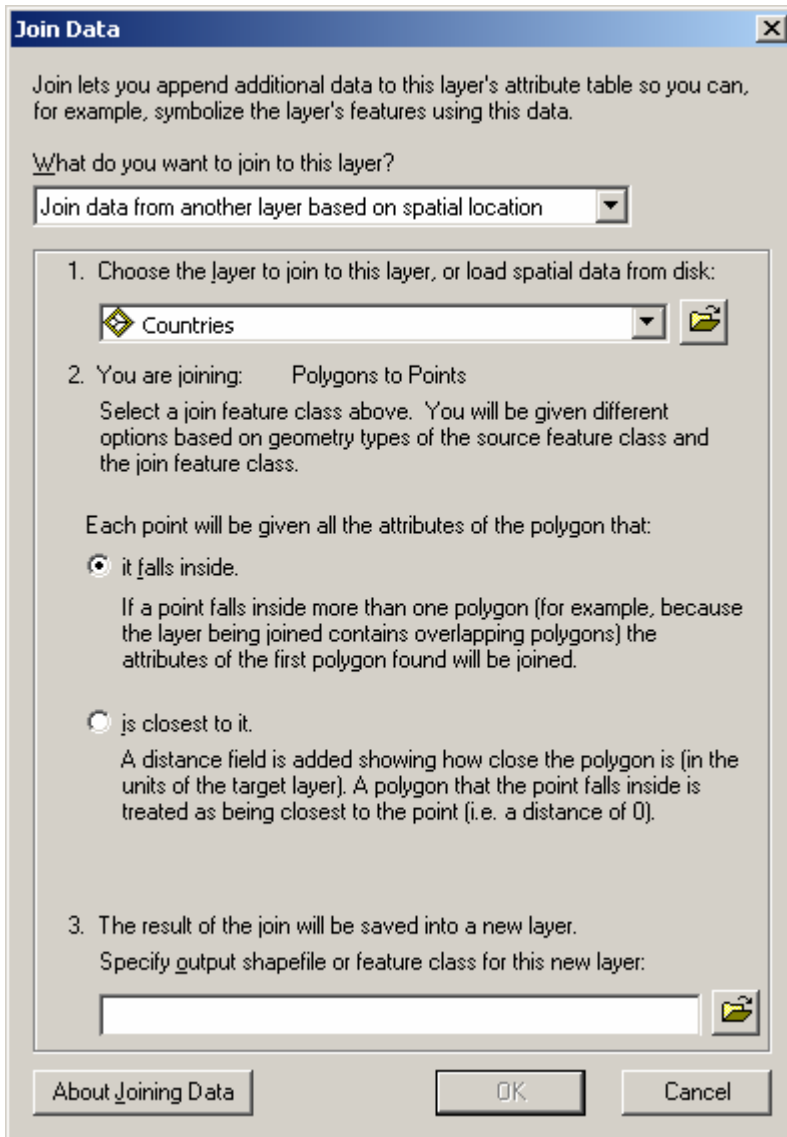
15) What is the relationship between extraction and fault lines? Why?

Use the select by location function to select extraction points within 20 km of fault lines.

16) What percent of extraction points are within 20 km of fault lines?

Right click on the extraction layer, and perform a spatial join with countries, as follows. Name the output with a logical name such as extraction_by_country and place it in your working folder on the computer.





Examine the attribute table of your new layer. Summarize on country name.

17) What three countries in this area of South Asia have the most mine extraction sites?

18) Does this answer agree with your visual assessment of the patterns that you made earlier?

Note that you are only examining parts of certain countries, such as Russia and Saudi Arabia.



19) Make the Geologic Units layer visible. Expand the legend. The field GLG indicates the code for the geologic unit.

A geologic unit is a volume of rock or ice of identifiable origin and age range that is defined by the distinctive and dominant, easily mapped and recognizable features (called "facies") that characterize it.

20) Make three observations about the pattern of geologic units in South Asia.

21) In which geologic units are most of the extraction features in?

Examine the oil and gas layer.

22) Name three areas in South Asia where the extraction features are concentrated.

23) Which would you say is more concentrated—mining, or oil and gas?

24) What effect does the mining extraction industry have on the density and routes of roads, highways, and pipelines?

25) Which is more common—oil or gas wells?

26) Which countries would you say have the most oil and gas wells?

Perform a spatial join on the oil_and_gas layer as you did on the extraction layer earlier to answer the following question.

27) What three countries in this area of South Asia have the most mine extraction sites?

Turn on the fault lines.

28) What is the relationship between oil and gas and fault lines? Why?

Use the select by location function to select oil and gas wells within 20 km of fault lines.

29) What percent of oil and gas wells are within 20 km of fault lines?

30) Summarize what you have learned about the spatial pattern of the extractive industries in South Asia from this lesson.

