

Teacher Notes

Oil Trade – Graphs and Maps

(adapted from ARGWorld Activity E – Association of American Geographers)

Overview

Students make three kinds of images to communicate about oil production and trade: line graphs to show trends in production and imports through time, scaled-symbol maps to show the amount of oil production in different countries, and flowline maps to show the volume of imports from oil-producing countries. These maps and graphs help guide discussion about the economic geography of this vital resource.

Learner outcomes and standards

After doing this Activity, a student should be able to:

- 1) create maps with scaled symbols to show oil production (point symbols) and trade (flowlines)
Standard 1: develop and use different kinds of maps;
- 2) describe recent trends in the production and trade of petroleum, a vital resource
Standard 11: explain the spatial aspects of systems designed to deliver goods and services;
Standard 16: describe and analyze world patterns of resource distribution and utilization;
- 3) appreciate the degree to which the American economy depends on imported energy
Standard 11: analyze historical and contemporary trade networks;
Standard 16: describe the use of resources in the contemporary world

This Activity fits world geography, economic geography, or the geography of Southwest Asia. It also fits world history and economics. The use of scaled symbols makes this Activity a lesson in graphical display of statistical information; the written extension meets language-arts standards in verbal summarization and persuasive writing.

Requirements and resources

Time: 10 minutes for a graph, 15 for each map, up to three days if students prepare profiles of individual oil-producing countries or engage in a debate about trade policy

CD units on Trade, Megacities (making scaled-symbol maps), Tea (inputs and outputs of an international business), Globalization (biography of a multinational company), Modern Migrants (flowline maps), Coffee Co-op (fair-trade coffee), and the NAFTA Highway (effects of a trade pact on a border city).

Activity 8A on Petroleum discovery and use, and 1G on oil trends in Egypt and Iraq.

Setting up the activity

International trade is an awkward topic to teach – it is seen as a very hot issue in some communities and viewed as a very boring topic in many others. The level of prior interest depends on whether a community has had part of its economic base threatened by competition from other countries or other trade-related issues. If so, the teacher has a natural lead in to this Activity:

- ? Do you know anyone who lost his or her job when [name a factory or office] closed last year?
- ? Ask your parents or grandparents what it was like during the Oil Embargo of 1973 or the rapid rise in oil prices in 2000.
- ? Could we have seen any of those events coming? Why did they happen?

Classroom procedures

- 1) Raise questions about trade between the United States and other countries.
- 2) Hand out one or both graphing activities and have students graph petroleum production and imports through time. Underscore the changing dependence on imported oil.
- 3) Use the CD unit on Megacities or a presentation on the whiteboard to demonstrate how to make proportional-circle maps to show amounts of production in different places.
- 4) Hand out the production map activity and have students make circle maps, individually or in groups.
- 5) Use the CD unit on Trade or a presentation on the whiteboard to demonstrate how to make proportional-width arrows to show volumes of trade between specific countries.
- 6) Hand out the import map activity and have students make arrow maps, individually or in groups.
- 7) Have students examine the historic pattern of petroleum trade and try to predict what might happen in the future, both for the whole world and with respect to individual countries.
- 8) If desired, have students prepare maps and graphs to support a proposal to extend the Free Trade agreement to selected oil-producing countries. Students could also study individual oil-producing countries and make posters, reports, or news articles to summarize their findings.

Alternative introductions

This Activity can also be started by having students look at labels on foods, tools, TVs, cameras, clothing, or automobiles. Many students have done this in earlier grades. If not, it is an eye-opening experience to realize how many consumer items come from other countries. Particularly, it is noteworthy how many items have petroleum as a source of raw materials as well as energy to process the material. Remind students that any item that contains polyester or nylon fabric, anything made of plastic, most sprays, paints, and other chemicals, and many other consumer goods use oil as part of their production process.

A third introduction involves looking at the self-sufficiency of nations for key commodities. An almanac or online source can be a good source of information about the percentage of food, oil, aluminum, coal, and other items that a given country produces within its borders. Exploring these tables can be useful, partly because the results often contradict simple ideas about wealth. For example, some resource-rich countries in the world are not particularly wealthy (e.g. Zaire, Russia), and some of the most prosperous countries (e.g. Japan, Switzerland) are dependent on others for oil and many other key resources.

Progress check (a non-intrusive way to see whether students are on the right track)

This Activity has a straightforward skill – students make symbols of varying size to show amounts of oil production or lines of varying width to indicate amounts of oil trade between nations. If students note that "this seems easy," ask them if they've ever seen a television or newspaper map that tries to put trade with an entire region into perspective. If so, congratulate them for awareness, and ask if the map they saw seemed accurate. That opens the question of map accuracy, which is one point of this Activity.

For the rest of the students, check for a cluster of circles in the Persian Gulf Region, and thicker lines from Venezuela in the earlier years and from the Persian Gulf, Canada, and Mexico in later years. Don't be afraid to point out that a map can be accurate and still hard to read if it is designed badly. Both maps require foresight and planning to do all the circles or arrows without crowding or overlap. That, in turn, allows a teacher to open a discussion of aesthetics as an aspect of effective communication with maps. After all, skill in graphic communication is one of the key goals of the National Geography Standards.

Evaluation

This Activity can be evaluated by the teacher. As with many map-making activities, however, it may be preferable to post the maps and have students evaluate them. Give students a checklist of criteria (or, better yet, have them devise a checklist in class discussion). Suggested criteria might include:

color. Arrows should be prominent, countries intermediate, and oceans receding.

size of circles. Circles should be accurately scaled, big enough to see, with minimal overlap.

width of arrows. Arrows should be accurately scaled, big enough to see, with minimal overlap.

placement of circles and arrows. The map should be accurate, clean, and uncluttered.

other information. A legend should show what is meant by symbols of different sizes. It might also include a scale of miles, especially if the area is unfamiliar. Short phrases of text can label key countries and other features, but too many labels can interfere with readability.

Extension and enrichment

One extension is to encourage students to investigate trading relationship with specific countries. Assign a country to each student or group. Suggest that they use almanacs, atlases, encyclopedias, the CIA Handbook, the United Nations Statistical Yearbook, the Yearbook of International Trade Statistics, or Web sites for various countries to get information about the population and major products of individual countries. The product of this investigation might be a poster to explain the pattern of trade.

Another extension is to summarize world trade for other specific commodities (e.g. aluminum, which has a distinctive and important pattern of production and consumption). Students could put plus signs in areas with a surplus of aluminum and minus signs in areas that do not produce enough for their needs.

Then, use the map of exporting and importing countries as a source of information and try to draw arrows that would satisfy the demand with the least amount of transportation. (You can bet that multi-national companies will not haul aluminum ore any farther than they have to. Any exceptions to the rule of least effort, therefore, are probably related to political agreements and disputes among various countries.)

<http://www.whitehouse.gov/fsbr/international.html>

<http://www.eia.doe.gov/> especially the weekly petroleum status report

<http://www.census.gov/foreign-trade/balance/index.html>

Concluding the activity

As stated earlier, students in some places think the topic of trade is dull, while others see it as vital and maybe even threatening. The goal in the Activity is to put figures in perspective, so that people can see how important things actually are. The wrap-up, therefore, should include ideas such as:

The total foreign trade of the United States is about 4 trillion dollars per year, more than 2.4 trillion dollars of imports and 1.6 trillion dollars of exports. The United States relies largely on imports for many important products in addition to petroleum, including raw materials such as tin, aluminum, and diamonds and high-tech factory products such as television sets and video games.

About 6 jobs out of 100 depend directly on production of things for export. Additional jobs depend on imports, which would not occur without exports to trade. Obviously, any change in trade with other countries will affect many Americans.

Trade is a classic example of geographic scale disparity. The benefits are felt at a personal scale and national scale – we all benefit from lower prices and a wider range of goods. Harmful impacts, in the form of closed factories, tend to hit at the local scale of a town or county. This is why questions of trade policy provoke such heated debate in Congress and business offices.

Frequently asked questions about trade: a sample dialog

Try to redirect students to focus on the communication purpose of a map

Student: 15 millimeters seems awfully big for the arrow from Canada. Is there some way we can make it smaller?

(Mistaken response: "Sure, just make all the arrows half as big." That's correct, but it loses an opportunity to explore the meaning of map symbols and their essential arbitrariness-within-conventional-limits.)

Redirection: What does that line really mean?

Student: It shows a certain amount of trade, right.

Teacher: Yes, but does it do that all by itself?

Student: I don't see what you mean.

Teacher: Does that line say 30 billion gallons all by itself? What else do we need in order to communicate that idea?

Student: You mean like a legend?

Teacher: Yes, the legend lets you compare a map line with a legend line that shows a specific amount of trade. Why don't we just mark the amount next to a line on the map?

Student: I suppose that would work.

Teacher: Maybe, but what would the map look like if we had 9 numbers on it as well as 9 lines?

Student: It would get pretty cluttered.

Teacher: Yes. That's the point of varying the widths of the arrows -- to communicate an impression of volume without cluttering things up too much. That lets you compare countries easily; it takes only an instant to see that this country exports a lot more petroleum than that one. At the same time, you can get individual values from the legend if you want them. So the map maker has to choose an arrow width that is small enough to fit on the map and still big enough to communicate the relative volumes of trade with different countries. Maybe you're right -- it might be better to have each millimeter show three billion gallons instead of two. Why don't you try that and then compare the result with your partner?

What other topics can we map with flowlines?

Migration, refugees, arms shipments, vacation trips, telephone conversations between students in the class and people in other cities, home cities of trucks in a truckstop

What conclusion should we draw from the maps of oil trade?

One obvious conclusion from comparing maps of oil trade in 1960 and 2000 is that the United States is importing a larger share of its oil than before. This has many implications, both economic and political, and therefore it is important for students to come to this conclusion on the basis of the evidence, not just assertions. Other CD units can add to the array of evidence that should be considered. For example, the units on Moscow Rings, Tokyo Mosaic, and Land Division all add background about transportation systems in different places (and thus their vulnerability to disruption in the event of oil shortages or price rises). The units on Brick-making and Floods explore some consequences of global warming.

Oil Production and Trade

Glossary of key terms

- alliance:** a friendly agreement between countries who wish to work together to achieve a common goal; OPEC (see below) is an example of an economic alliance
- balance of trade:** measurement of exports minus imports
- coterminous:** having the same bounds or limits; most commonly refers to the 48 states of the US that are together in North America (all the states except Alaska and Hawaii).
- basemap:** a simple map that shows basic place information (land, water, country borders, etc.); people can add other information to a basemap to tell a story
- efficiency:** a concept that refers to getting the most work done with the least amount of energy or effort exerted; trade can be made more efficient by cutting down on costs or by finding a shorter route
- export:** movement of goods out of a country
- Fair Trade Organization:** group of producers who form an organization to help them produce, transport, and market their products (see the CD unit on Coffee Co-ops)
- flowline map:** a type of map that shows the flow or transfer of something between places; the amount of movement is usually indicated by the width of the flowline
- Free Trade Zone:** area set up with low taxes and other subsidies to encourage production and/or trading of goods (see the CD unit on Export Zones in Indonesia)
- import:** a good or service that people in one country buy from people in another
- import substitution:** attempt to reduce a balance-of-trade deficit by producing things that replace goods imported from other countries; for example, encouraging the use of synthetic fabrics in a country that has to import cotton because it has no farmland with a long enough growing season for that fiber crop
- line graph:** a type of graph that uses lines to show the change in the value of something over time (see the CD unit on Migration to Australia)
- map vocabulary:** the lines, symbols, colors, and/or areas that a mapmaker uses to communicate information in a map (see the CD unit on Choosing Map Symbols)
- NAFTA:** NAFTA stands for the North America Free Trade Agreement; NAFTA is an agreement among Canada, the United States, and Mexico to eliminate import taxes and other barriers to trade (see the CD unit on the NAFTA Highway)
- Oil Embargo of 1973:** OPEC started an oil embargo in order to get higher prices for their oil; the embargo resulted in high gas prices in countries like the United States
- OPEC:** The Organization for Petroleum Exporting Countries; an organization formed to further the rights of countries in which exporting oil is a major industry
- point symbol:** circle, square or other diagram that represents something at a specific point (see the CD unit on Megacities)