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U.S. History  
History-Social  
Science Standard  
11.5.7.



# Mass Production, Marketing, and Consumption in the Roaring Twenties

## **California Education and the Environment Initiative**

Approved by the California State Board of Education, 2010

### **The Education and the Environment Initiative Curriculum is a cooperative endeavor of the following entities:**

California Environmental Protection Agency  
California Natural Resources Agency  
California State Board of Education  
California Department of Education  
Department of Resources Recycling and Recovery (CalRecycle)

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## **Lesson 5** Consequences of Consumption

None required for this lesson.

# California's Waste Tire Problem

## Part 1



In August 1998, more than seven million used tires caught fire in an illegal dump outside of Tracy, California. Dense black smoke plumed to heights of 6,500 feet, carrying with it particulate matter, carbon monoxide, nitrogen oxides, heavy metals, and other toxic substances. The piles had reached as high as 50 feet and spread out over 52 acres among used oil filters, abandoned vehicles, and other refuse.

The fire started when the tire dump's owner was mowing nearby grassland. When sparks from his tractor engine ignited the grassland, flames leaped to the piles of tires. Emergency response teams decided not to extinguish the fire. They feared that water used to dampen the flames would create hazardous runoff, which could threaten groundwater. The Tracy Tire Fire burned for more than two years before firefighters finally extinguished it in December 2000. It took over five years to remove partially burned tires, debris, and more than 50,000 cubic yards of contaminated waste. Clean-up costs totaled \$18 million.

### An Environmental Disaster

The Tracy Tire Fire was an environmental disaster resulting from the millions of used tires accumulating in California



Burning tires

since the 1920s. Tires are not classified as hazardous waste, however, once ignited, they create dense clouds of hazardous pollutants. Because tire fires are so difficult to extinguish, pollutants can be released into the air for months or years. Because of their hollow shape, about 75 percent of a tire is empty space. This space holds a large oxygen supply and even funnels air drafts throughout tire piles which “fan” a fire. Tire fires burn at very high temperatures, which forces pyrolytic oil, a tar-like substance, out of the rubber. The rubber in a tire contains approximately two gallons of oil, which, if released, can contaminate soil and water. Hazardous waste from a tire fire can also contaminate surrounding areas with arsenic, lead, and numerous other toxic compounds. This toxic waste must be contained so that it does not leach into groundwater or nearby surface water. In many cases, the contaminated soil must be removed and transported to a hazardous waste landfill.

California has more registered vehicles than any other state. A byproduct of this “car culture” is the use of a staggering number of tires. Californians generate 40.8 million used tires annually, some of which could



Discarded tires

be reused. Another 1.5 million old tires are held in illegal stockpiles where they provide a habitat for rodents and other pests, such as mosquitoes, that breed in rainwater that collects in the used tires. Tires, unless processed, may not be disposed of in municipal landfills, where they can rise to the top of the waste pile because of their relatively light weight. Whether in landfills or illegal stockpiles, used tires create a fire hazard. Illegal dumping of waste tires is a problem in many parts of the country, and California is no exception.

### A Mounting Problem

People often travel to impoverished areas, such as inner-city alleyways and rural areas, to dump used tires. Some people dump their old tires because they simply do not know about the hazards they create. Others dump the old tires because they do not care, as long as the tires are gone from their backyards. Major environmental disasters like the Tracy Tire Fire, remind us of just how dangerous it is to stockpile used tires.

Californians will consume approximately 200 million tires

over the next five years. This means we will have 200 million additional waste tires to manage. As our population grows and more people drive on highways every year, an important question remains, What should we do with all of these old tires?

## Part 2

The California Integrated Waste Management Board (CIWMB) is one of six agencies under the umbrella of the California Environmental Protection Agency (Cal/EPA). The CIWMB is responsible for the collection, transportation, processing, recycling, or disposal of waste materials in California. Managing waste tires is one of CIWMB's jobs. This State entity has an active role in reducing landfill waste and stockpiling, in recycling material from used tires, and in protecting public health and the environment.

Each year, the CIWMB successfully diverts more than 30 million used tires from stockpiles or landfills. The CIWMB provides money to local governments to recover waste tires from the public. It also pays for the development of public education materials to raise public awareness about the problem of waste tires in California.



Crumb rubber

Once waste tires are collected, they can be reused, retreaded, or recycled. If tires still have a legal tread depth, they can be reused. Each year about two million used tires are sold and reused. Tires can be retreaded if they are too worn down for reuse. California has more than 50 retread plants, which sell millions of retreaded tires each year.

One of the main ways the CIWMB keeps tire waste out of landfills is by developing markets for recycled tire materials. It funds research projects to find new uses for tire products,

as well as provides economic incentives to local governments and businesses to use and manufacture recycled-tire products. One such product is crumb rubber, which can be used for playground turf, speed bumps, carpet tiles, mats, sound barriers, and molded rubber products. Rubberized asphalt can be used to repave roads. It is more durable and smoother than conventional asphalt and helps reduce traffic noise. Tire shreds have been used to build highway retaining walls as well as dampen the sound in light-rail

systems. Tires are also burned for fuel, most of which is used in the cement manufacturing industry. The public can support such new uses of old tires by buying tire-derived products, such as playground equipment, roof shingles, and new tires made from recycled rubber.

The CIWMB also plays a major role in the cleanup and remediation of tire dumps, as well as in the tracking and law enforcement actions needed to prevent such dumps. The CIWMB began remediating old tire piles in 1994, and it has removed over 771,128 tons of illegal waste tires and contaminated trash from 60 sites. Cleanup involves stabilizing tire piles, removing

and transporting tires to a facility where they can be recycled, and removing any leftover toxic wastes. The total cost of site remediation has been \$40 million. Most of this money was spent on major tire fires, such as the one in Tracy.

The CIWMB works with local law enforcement and highway patrol agencies to stop illegal tire dumping, which is concentrated in U.S. border regions. Some of the tools they use to monitor illegal tire dumping include satellite technology and motion-activated surveillance. The Waste and Used Tire Hauler and Manifest Program requires waste haulers to register and record each tire transaction. This

tracking system helps to monitor the flow of waste in the state.

When Cal/EPA, local governments, law enforcement agencies, private businesses, and an educated public work together, tires can be reused, retreaded, or recycled to make many useful products. Used tires are not just a waste product to be discarded. Instead, when handled properly, they can become a valuable resource.

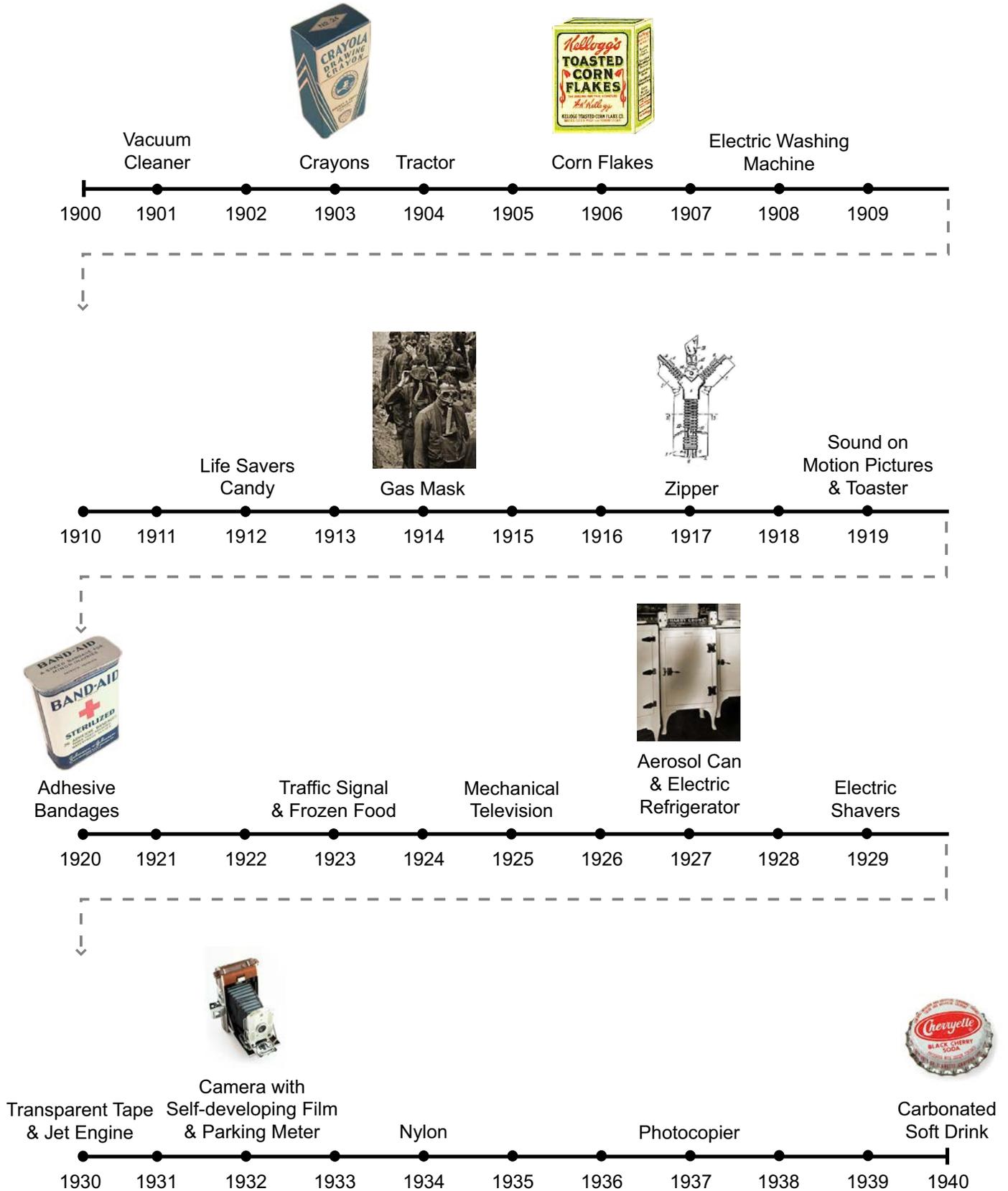
*Note: As of January 1, 2010, the California Integrated Waste Management Board became the Department of Resources Recovery and Recycling, under the California Natural Resources Agency.*



Illegally dumped tires

# Inventions Timeline

## Lesson 2



During the 1920s, many inventions led to new products that changed the way people lived and worked. These products may have changed form, but all of them are still part of our lives today.

### **Alarm Clock**

Instruments and methods for keeping time are some of the oldest of human inventions. A clock is a modern example of a tool that monitors or tracks time. In 1876, the Seth Thomas Clock Company



Alarm clock

received a patent for a new kind of clock, a small bedside alarm clock. Small alarm clocks became popular, and major U.S. clock companies started making them. Manufacturers improved the small clock construction, and by the 1920s, they mass-produced and marketed the clocks as an essential appliance for every home.

The clocks contained a complex system of metal gears, alarm bells, hands, mounting rings, and knobs. A glass lens enclosed the metal hands, which points to printed or painted numbers on a metal face. In the 1920s, clocks were wound using thin metal strands. Today's alarm clocks operate on batteries, electricity, or solar power.

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### **Camera**

Cameras allow people to take photographs of objects by working with light. Cameras generally consist of an enclosed hollow with an opening at one end for light to enter. Most cameras have a glass lens positioned in front of the camera's opening to gather the incoming light and focus all or part of the image on a recording surface at the other end of the camera.

The first small, portable camera for photography was built by Johann Zahn in 1685, but it would be almost 150 years before technology caught up to the point where this was practical. Early photographic cameras were similar to Zahn's model, but usually with the addition of sliding boxes for focusing. Before each exposure, the photographer had to insert a sensitized plate in front of the viewing screen to record the image.

In the 1920s, the box camera was popular. These box cameras were mass-produced with inexpensive glass optics and metal covered with leatherette. Leatherette is a kind of imitation leather made of paper, cloth, or plastic. The entire back of the camera opened to insert and remove the film, which was loaded onto a chrome rail and rolled onto a metal screw.



Camera

### Canned Food

Canning is a method of preserving food by processing it and sealing it into an airtight container, which is usually metal. The French military first developed this process as a way of protecting food from spoiling. As the canning process was mechanized, and urban populations grew throughout Europe, demand for canned food increased. Inventions brought improvements to the process. In 1812, the first U.S. canning factory in New York City used improved tin-plated wrought-iron cans for preserved oysters, meats, fruits, and vegetables. Demand for canned foods increased during wars and skyrocketed during World War I.

Today, tin-coated steel is the material most commonly used for canned foods.



Canned food

### Lightbulb

Considered to be one of the most life-changing inventions in human history, the electric lightbulb affects our everyday lives and makes many nighttime activities possible. While earlier experiments in electric lighting are documented, Thomas Alva Edison is credited with the development of the “incandescent lamp,” or lightbulb, in 1879. As electricity became more available in the early 1900s, the demand for and production of lightbulbs increased.

The incandescent lightbulb provides electric light through incandescence, or heat-driven light emissions.



Lightbulb

An electric current passes through a thin filament—a thread of metal, which is usually tungsten—heating it until it produces light. A glass globe encloses the filament and prevents the oxygen in air from reaching the hot filament, which would destroy it. Incandescent lightbulbs are made of glass, tungsten wire, small wires, and metal sleeves. Low-pressure inert gas, usually argon, neon, or nitrogen, fills the glass globe.

Due to the high energy usage of incandescent lightbulbs, more energy-efficient alternatives have been developed recently, for example, compact fluorescent lamps and LED lamps. Some governments have passed laws to phase out the use of incandescent lightbulbs. Brazil and Venezuela began to phase them out in 2005. Other nations have scheduled phase-outs: Ireland and Switzerland in 2009, Italy in 2011, Canada in 2012, and the United States between 2012 and 2014. As a result, efforts to improve the efficiency of incandescent lamps are being made. General Electric has announced work on “high efficiency incandescent” (HEI) lamps, which are expected to be four times as efficient as current incandescent lamps.

### **Telephone**

Alexander Graham Bell was credited with the invention of the telephone, although many other inventors claimed this invention as their own. Between 1844 and 1877, several versions of a device that transmits and receives sound were created, using various materials to transmit sound. In 1877, Thomas Edison received a patent for his carbon transmitter. He set up the first telephone system, called an exchange, in New Haven, Connecticut in 1878. In this exchange, people with telephones could communicate through operators working at a switchboard. In 1923, the first rotary dial telephone was developed in France.

As telephone systems and telephones for home use improved, they were mass-produced for



Telephone

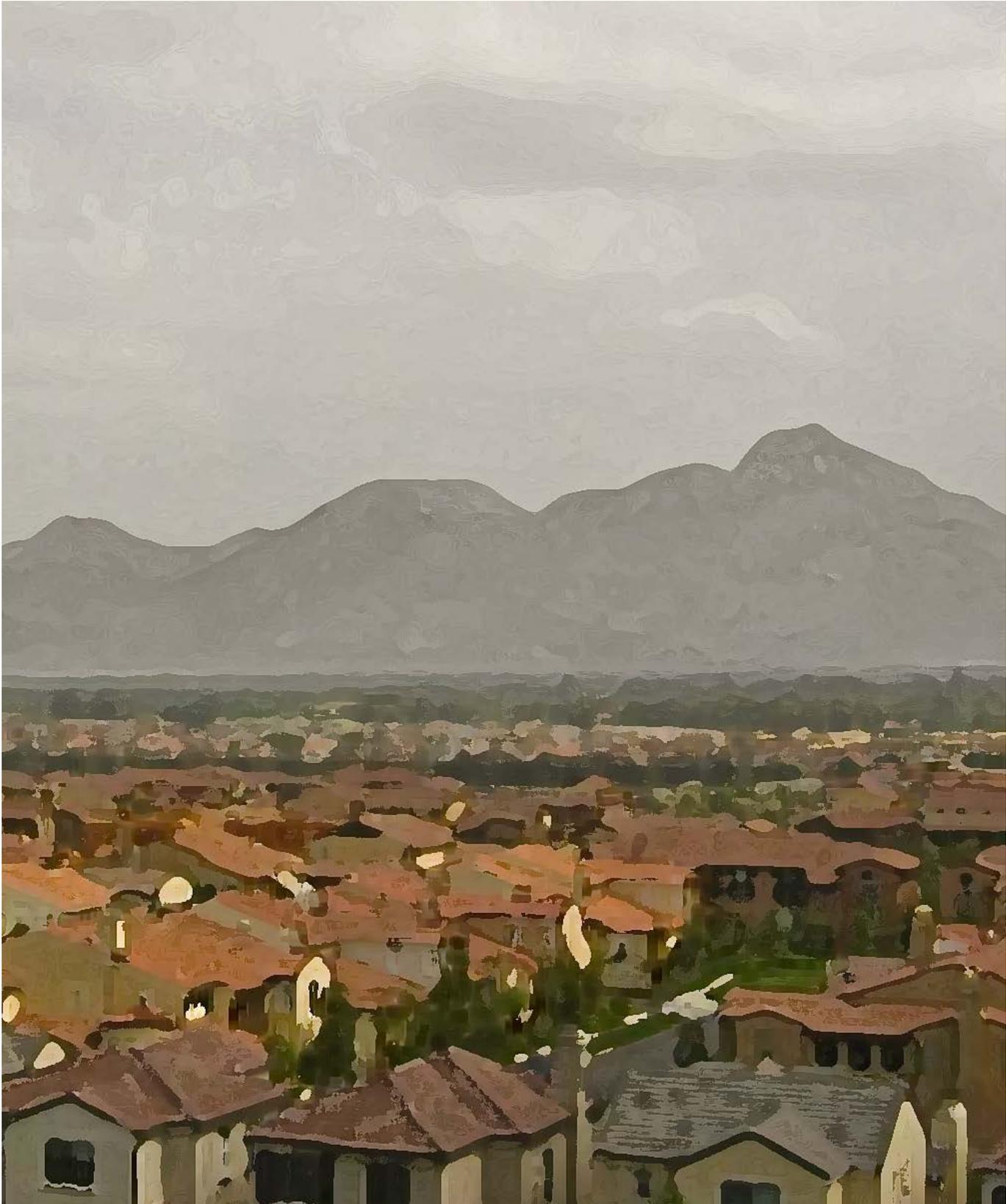
consumers. Rotary dial telephones manufactured in the 1920s were made of wood or zinc alloy (changed to thermoplastic in 1941), carbon microphones, metal bells and parts, iron, wires, and magnets.

**A Clear Day, 1903**

Lesson 4

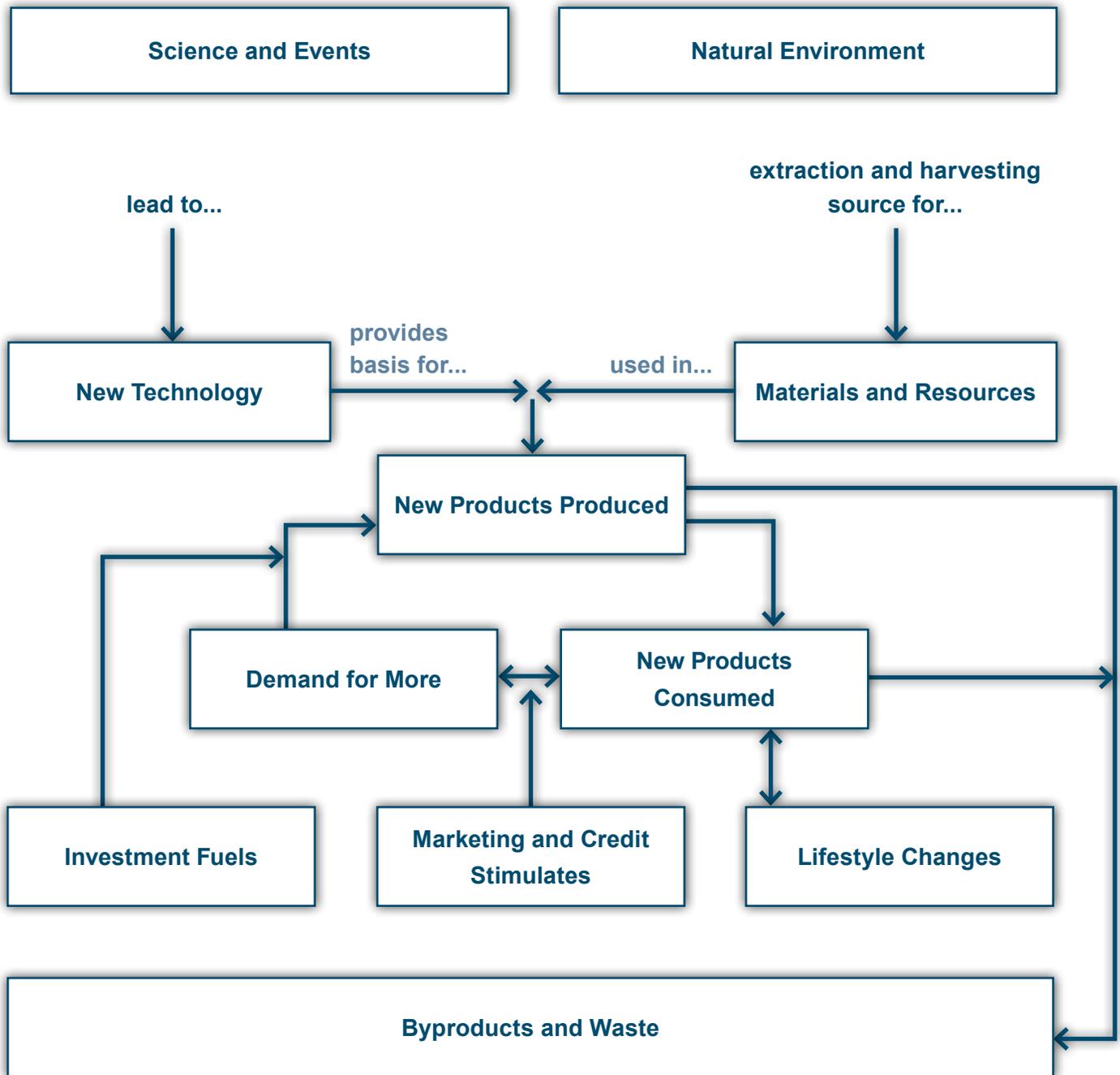
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# Production and Consumption Flowchart

## Lesson 4







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