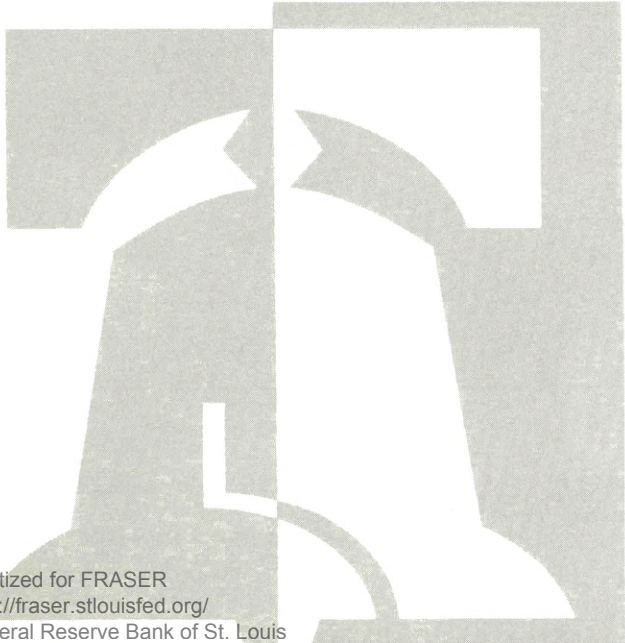
How to Run a River

Vietnam: How Much Heat at Home?

The Seventies Belong to the Susquehanna

FEDERAL RESERVE BANK OF PHILADELPHIA

BUSINESS REVIEW



SEPTEMBER 1965

BUSINESS REVIEW is produced in the Department of Research. Evan B. Alderfer was primarily responsible for the article "How to Run a River", Kathryn Kalmbach for "Vietnam: How Much Heat at Home?" and D. Russell Connor for "The Seventies Belong to the Susquehanna." The authors will be glad to receive comments on their articles.

Requests for additional copies should be addressed to Bank and Public Relations, Federal Reserve Bank of Philadelphia, Philadelphia, Pennsylvania 19101.

WATER

All the rivers run into the sea; yet the sea is not full; unto the place from whence the rivers came, thither they return again.

With poetic eloquence the author of *Ecclesiastes* described how water goes round and round. It still does. The sun's heat evaporates oceanic and other waters; winds scatter the moisture-laden clouds; weeping clouds shed their moisture as rain, and that which falls over land finds rivery pathways back to the sea.

Nature's hydrologic cycle, however, plays favorites. Land areas with abundant rainfall luxuriate with vegetation; regions with scanty precipitation turn to deserts. So dependent upon water is mankind that a homey philosopher once observed the coincidence of big rivers flowing past big cities and little rivers flowing past little cities.

Precipitation over the United States is plentiful in the aggregate, but unevenly distributed. The Eastern third of the country and the Pacific Seaboard are generally well watered; but a vast area between the Rockies and the 100th Meridian, bisecting the Dakotas and Texas, is handicapped with chronic sparsity of rainfall.

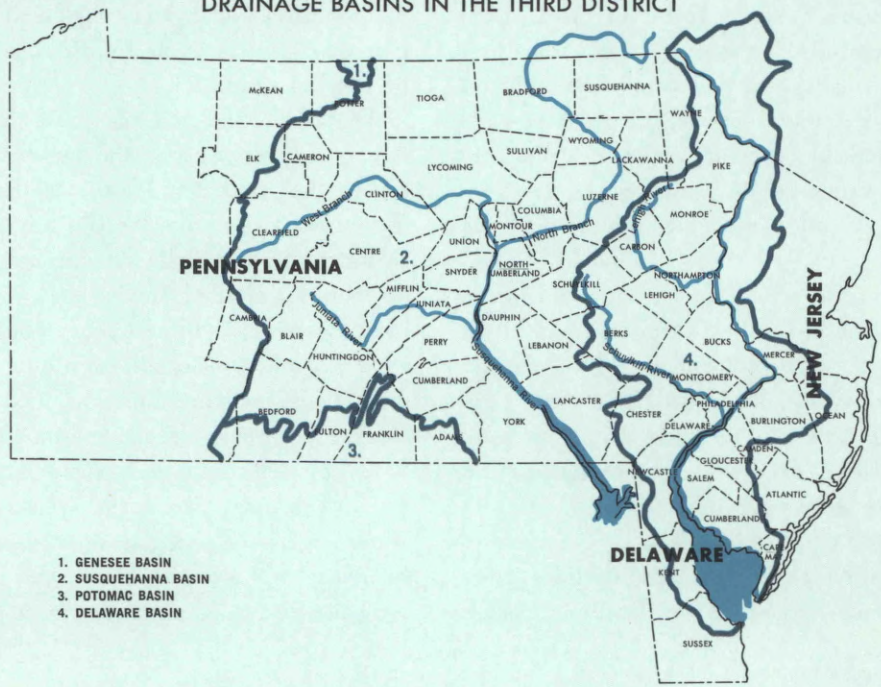
Precipitation in the 37,000 square miles that constitute the Philadelphia Federal Reserve District is comfortably above the country's annual average. Over the years, with occasional exceptions, the district's rainfall has been adequate for its 10 million inhabitants. Within the district, however, the supply of water varies from time to time and place to place because of unequal distribution and the peculiarities of the watercourses.

Owing to the irregularity of land contours, rainfall in the district wanders seaward by devious ways from different basins. The largest basin is the Susquehanna, which drains into the Atlantic by way of Chesapeake Bay. Along the New York state border is a small section of the Genesee Basin that drains into the St. Lawrence River. Along the Maryland border is an area of the Potomac Basin, and on the western border some district waters drain into the Ohio River. The eastern part of the district lies in the Delaware Basin. It is heavily populated and highly industrialized, in marked contrast with the other district basins which are largely rural and agricultural.

Rainfall in the predominantly agricultural basins serves a most essential use to the resident farmers, and the runoff into the rivers serves municipalities and industries. How well a river serves its basin population depends basically upon the size of the river and the number of people the river is called upon to serve. For a given flow of water, the greater the population the harder the river must work. Also, the harder the river works, the greater the problems of water pollution and abatement. A country river is a many-splendored thing, but urbanization usually transforms it into a many-plundered thing.

Because of the economic, political, and social importance of water resource utilization, this issue of the *Business Review* is given over largely to the district's two major rivers and their basins—the Delaware and the Susquehanna.

DRAINAGE BASINS IN THE THIRD DISTRICT



HOW TO RUN A RIVER

Rivers seldom get into the newspapers except when they go on a rampage, overflow their banks, and drown people. The Delaware, however, has been in the headlines most of the summer, not because of high water but because of low water.

The basic trouble is that the prolonged drought has so reduced the flow of the river and the storage in reservoirs that downstream people may soon have to drink salt water and upstream users may have no water—unless refreshing rains come to the rescue.

As rivers go, the Delaware is a small stream. It doesn't really look like a river until it gets below Trenton; in fact the river is only a little over 300 miles long, but it serves the most heavily populated and highly industrialized part of the country.

The Delaware serves over 21 million people. In normal times it serves them very well, but a prolonged period of subnormal rainfall has produced abnormal times. Philadelphia, the biggest city on the Delaware, gets half of its water from this river and the other half from the Schuylkill —the Delaware's largest tributary. Drafts from both sources, after use, are returned to the Delaware.

New York, the biggest city on the Hudson River, taps the upper Delaware for one-third of its municipal requirements; and the Delaware draw-off, after use, is flushed into New York Bay. During a severe drought both cities are menaced—New York with a water shortage and Philadelphia with a salt problem.

The lower Delaware is an estuary—an arm of the sea. With the ebb and flow of tides, salty seawater sloshes up and down the lower reaches of the river. Ordinarily, the fresh-water flow keeps the salt-water intrusion below Philadelphia, but during periods of low flow the salt line creeps upstream. Recently the salt line had advanced to a point near the Walt Whitman Bridge, only 15 miles short of Philadelphia's Torresdale water-supply intake. As the drought worsens the related problems of upstream scarcity and downstream salinity are intensified.

Such, in brief, is the unhappy tale of two cities.

Whence the drought?

"Hydrologic adversity" is what the region is suffering from, according to the Water Resources Council's special report to the President, entitled "Drought in Northeastern United States." The Delaware Basin has had this trouble before, and now it has it again. The severity of the current drought is explained by the fact that the Basin is in its fourth consecutive year of insufficient rainfall.

Abnormal wind patterns cause the prolonged dry spell, according to the meteorologists. We are in the wind belt known as the Prevailing Westerlies. Ordinarily, the Basin is well watered by air masses heavily laden with moisture picked up from the Gulf of Mexico and South Atlantic coastal waters. As these warm clouds are chilled by the cooler westerlies over our region they drop their moisture as rains, called thunderstorms. For some strange reason the westerlies have deviated from their customary pathways, thus weakening the storm systems. Why the winds are misbehaving nobody seems to know, but everybody is aware of the drought. Farmers were the first to be pinched, and now the urban

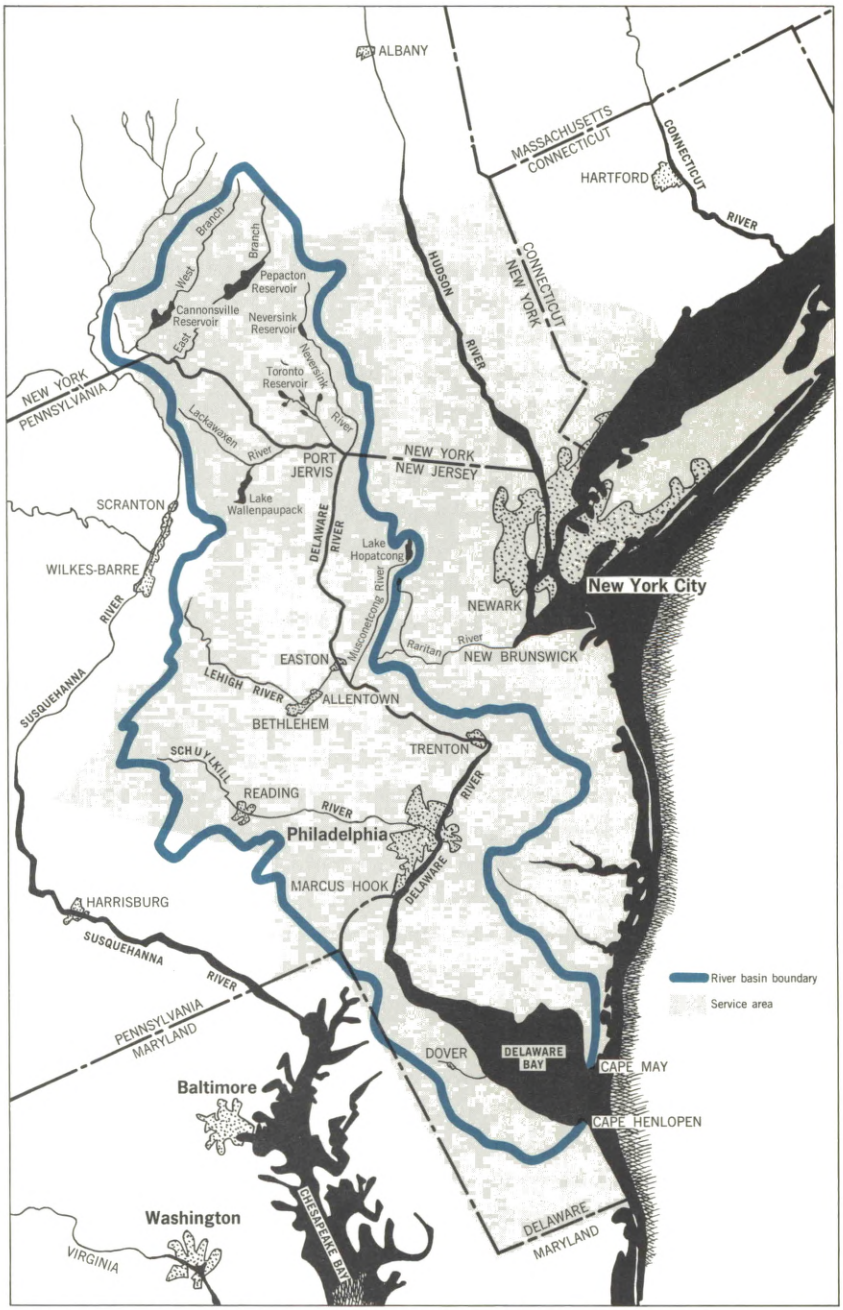
masses are in jeopardy.

Behold the Basin!

The Delaware River Basin is a long, narrow, irregularly shaped area of land from which the Delaware and all its tributaries carry precipitation to the Atlantic Ocean. It's a hydrologic gerrymander outlined by the heavy lolloping line on the map, "Delaware River Basin and Service Area," showing both the in-Basin and out-Basin areas served by the river.

Rivers make convenient boundary lines, but their basins pay no attention whatsoever to political boundaries. As if conscious of its destiny to serve two big cities, the Delaware starts out as two streams—the West Branch and the East Branch—both originating on the western slopes of the Catskill Mountains in New York. From Hancock, New York, the point where the two branches merge, to Port Jervis the Delaware forms the boundary line between Pennsylvania and New York. From Port Jervis down to

DELAWARE RIVER BASIN AND SERVICE AREA



Source: Water Research Foundation for the Delaware River Basin.

Marcus Hook the river forms a boundary between Pennsylvania and New Jersey, whence it forms a boundary between New Jersey and Delaware until the river is swallowed by the Atlantic Ocean. Throughout its indecisive meandering the river is joined by numerous tributaries such as the Lackawaxen, the Musconetcong, the Lehigh, and the Schuylkill rivers. The tributaries, in turn, pick up little sub-tributaries like Lollypop, Devils Hole, Cranberry, and Wigwam creeks, not identified on the map.

The upper section of the Basin is a thing of beauty and a joy to sportsmen. The middle region is endowed generously with extensive woodland, good agricultural land, and the famous Delaware Water Gap. The lower region, in the Atlantic Coastal Plain, is heavily industrialized.

The estuarine section from Trenton to the sea has sufficient depth, with occasional dredging, to accommodate ocean-going vessels loaded with cargoes of iron ore, petroleum, sugar, and other raw materials for the manufacturing industries of Philadelphia and adjacent ports. From Bristol to Wilmington the river is virtually palisaded on both sides with industrial establishments.

Manufacturing industries, including the more than twoscore producers of kilowatts on the Delaware and its tributaries, are the heaviest users of water. Water is used by the steam-electric generating stations in their condensers for cooling purposes; by the steel mills and the petroleum refineries to cool their furnaces; by the paper mills in almost every stage of the manufacturing process from their digesters to the cylinder or Fourdrinier paper-forming machines. Water is indispensable to all manufacturing industries.

Philadelphia and other riverside municipalities also use huge amounts of water. The Delaware supplies them with water for domestic use —drinking, bathing, home laundering, lawn sprinkling, etc.; commercial use by hotels, motels, restaurants, and other public establishments; and industrial use such as laundromats, car washeries, etc.; and public purposes such as fire fighting and street cleaning. Total municipal demand averages about 145 gallons per capita daily.

Unlike some Western rivers that occasionally run bone dry, the Delaware, throughout its recorded history, has always had water. The flow of water, however, fluctuates with the volume of precipitation—which over the years averages 44 inches annually in the Basin. Forty-four inches is a good average (the United States average is 30 inches), but people don't live on averages; they need a daily supply of water. Precipitation in the Basin is both seasonal and cyclical.

Springtime is the season of abundant water produced by the March melt of winter's snow and April showers. That's when the tributaries give full measure to the main stream. In the fall months of the year, less rainfall causes the entire river system to languish with low waters. And now the river languishes in a drought-induced low flow which forebodes still lower waters as we enter the fall season.

Use and misuse of the Delaware

While people on the lower Delaware, where the Basin's greatest density of population exists, have seldom been menaced by a shortage of water, they have had to contend, for a number of years, with an equally bad problem—dirty water. How the Delaware became defiled is a typical example of expanding public and private use of a natural resource that proceeds by easy stages from use to overuse to misuse.

Industries and municipalities, the greatest

users of water, do not *consume* it in the usual sense of the term. Almost every gallon of water that they withdraw and use is later returned to the river, but often in filthy condition.

In the days of careless exploitation of natural resources, manufacturing industries got rid of their industrial wastes by the simple expedient of piping them into the river. Acid mine drainage from the anthracite region oozed into the Delaware by way of the Lehigh River, and the Schuylkill became badly polluted with culm deposits washed down from the hard-coal fields. To compound the pollution, riverside municipalities dumped their raw sewage into the river. Philadelphia, the largest municipality and the largest industrial center, was the biggest polluter and for years nobody seemed to care. With expanding population and growing industrialization the once lordly Delaware degenerated into a malodorous sewer intolerable to both ships and shad.

The Delaware is taken to the laundry

The Interstate Commission on the Delaware River Basin (Incodel), organized in 1936, was one of the first organizations to campaign vigorously and effectively for water pollution control. By and by, Incodel's missionary efforts, along with the help of other organizations, succeeded in fomenting anti-pollution legislation on both sides of the river. With local action and federal assistance, the Clean Streams Program got under way in the mid-1940's. Although the river is much improved, its waters still need extensive treatment for municipal and other uses.

Shad return to the Delaware

Philadelphia doesn't do things half way. When the city pollutes it pollutes thoroughly, and when it cleans it cleans vigorously. Evidence of both phases is the departure and the subsequent return of shad to their Delaware spawning grounds.

"One of the most modern and efficient water treatment plants in the world is Philadelphia's Torresdale Plant on the Delaware River." That statement is not made by Philadelphia's Water Commissioner; it appears in a United States Geological Survey publication. The Torresdale plant is a pushbutton water-treatment plant capable of purifying over 400 million gallons a day by filtering and treating river water with various chemicals. Philadelphia also treats all of the city's sewage before returning it to the river. The city's entire waterworks and sewage-treatment facilities are under a single unified management and control.

Most of the industrial plants now also treat their wastes before returning them to the river; indeed, with some plants it is a point of pride that their effluent is cleaner than the intake. Farther downstream, however, salinity is almost a constant problem—so much so that some concerns in Chester use municipal water obtained from the Octoraro Creek in the Susquehanna River drainage area.

When the Delaware flowed into the Supreme Court

The waist line of the Delaware Basin is about on the latitude of New York City, as the map shows. Back in the early 1920's the New York City fathers looked longingly upon the Delaware as a source of mountain-fresh water to augment the city's growing water needs.

While their engineers made plans to dip into the Delaware for 600 million gallons a day, a document was drawn for an interstate compact between New York, New Jersey, and Pennsylvania. The compact was ratified promptly by

the New York legislature; but New Jersey and Pennsylvania demurred. After considerable delay, New York City went ahead with its plans; whereupon New Jersey petitioned the United States Supreme Court to enjoin the city and state of New York, and Pennsylvania joined in the petition.

Justice Oliver Wendell Holmes delivered the opinion of the Court, specifying a mgd (million gallons daily) upper limit that New York City might withdraw. Also, since such drafts, after use, are channeled seaward outside the Delaware Basin, the Court required New York to fortify the Delaware in periods of low flow with releases of water from their reservoirs in the Basin in order to prevent damage to the down-Delaware recreation areas and the lower Delaware oyster beds. That was in 1931.

In 1949, New York City barely squeezed through a water shortage, and in the early 1950's shortages of rainfall caused another crisis. As the city's reservoirs ran low, the mayor banned use of water for washing streets, sprinkling lawns and gardens. Authorities proclaimed "dry Thursdays," imposed fines upon owners of leaky faucets, automobiles went unwashed, restaurants served drinking water only upon request, and public-spirited New Yorkers skipped baths and shaves. As the crisis worsened, New York petitioned the Supreme Court for more water from the Delaware.

The Court, in its 1954 decision, allowed New York City to dip a little deeper into the Delaware. The ante, in terms of mgd's, was raised but again the Court imposed a *quid pro quo*. In compensation for increased drafts from the Delaware, the city was required to supply the lower Delaware, from the upper Delaware and its tributaries, with sufficient water to maintain a specified minimum flow (expressed in cubic feet per second) at the Delaware's Montague gauging station in Sussex County, New Jersey. The Court also appointed a River Master to administer the adjudication.

Formation of the Delaware River Basin Commission

As a result of the recurring water-shortage problem, causing periodic disputes between New York City and downstream communities over water rights, it became increasingly apparent that settlement of quarrels in chancery is no way to run a river. Supreme Court adjudication, while restoring amity in times of water scarcity, accomplished nothing to prevent a future scarcity.

Governors of the four states immediately concerned and the mayors of the two most vulnerable cities—New York and Philadelphia—held summit conferences to consider ways and means toward a mutually satisfactory solution. They appointed a Delaware River Basin Advisory Committee to devise an inter-governmental arrangement for long-range, multi-purpose planning, development, and management of the Basin. That was in the early summer of 1955.

Hurricane Diane struck the Basin with torrential rains, causing floods that took 99 lives and inflicted over $100 million in property damage. The disaster stimulated a public clamor to do something about the Delaware.

Congress acted quickly, directing the Army Corps of Engineers, in cooperation with other federal agencies, to make a survey and formulate a plan for the physical control of the waters to reduce both the high-water *and* low-water hazards. Meanwhile, the Water Resources Association of the Delaware River Basin, a nonprofit and nonpartisan citizens group, was organized to alert the general public to the needs of the Basin.

Late in 1960, the Corps of Engineers turned in an exhaustive 11-volume report advocating a 50-year development program of 58 water-control projects, at an estimated cost of almost $600 million to reduce flood damage, augment stream flows, provide additional recreation waters, and more kilowatts of hydro-electric power. Though at some variance with an earlier report prepared under the auspices of Incodel, physical features of the Engineers' report were subsequently adopted.

After further discussion, complete water-resource planning and management for the Delaware Basin were at long last designed. On September 27, 1961, President Kennedy signed the Delaware River Basin Compact, already approved by the Congress and legislatures of New York, Pennsylvania, New Jersey, and Delaware. The document, the first of its kind, provided for 100 years of joint federal-state administration of the Basin. The Compact created the Delaware River Basin Commission, endowed with authority and responsibility to supervise the Basin's water resources. The Commission superseded Incodel which, even in its limited advisory capacity, had achieved remarkable results in focusing public attention and stimulating legislation for better utilization of Basin waters.

The Delaware River Basin Commission is a five-member board consisting of the Governors of the four Basin states—Pennsylvania, New York, New Jersey, and Delaware—and the Secretary of the Interior represents the President of the United States. Sitting at present as voting alternates on the Commission are: Maurice K. Goddard, Pennsylvania's Secretary of Forests and Waters; for New York, Harold G. Wilm, New York State's conservation commissioner; for New Jersey, H. Mat Adams, former state conservation commissioner; for Delaware, Norman M. Lack, a retired Army general associated with the Water Research Foundation; and for the Secretary of the Interior, Vernon D. Northrop, former city administrator during Joseph Clark's administration as mayor of Philadelphia.

The D.R.B.C. at work

Running a river is no simple task, especially one in such great demand as the Delaware. The Commission's work embraces conservation and development of ground and surface water supply for municipal, industrial, and agricultural uses; flood damage reduction; development of recreational facilities in relation to reservoirs, lakes, and streams; propagation of fish and game; development of hydro-electric power potentialities; control of movement of salt water; abatement and control of stream pollution; and regulation of stream flow toward the attainment of all these goals.

Attainment of these multi-purpose goals requires, among other things, economic analyses and forecasts of population growth in the Basin and its service area, a constant flow of meteorologic and hydrographic data, a running record of water-quality analysis at strategic points throughout the river system to maintain minimum standards of water-quality patterns for various uses, and elaborate cost calculations to balance potential expenses of various projects against consumer benefits.

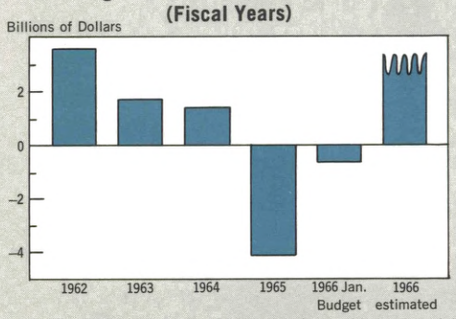
"A river system such as the Delaware," says the Commission in its 1964 Annual Report, "offers innumerable possible operating combinations. For example, adjustments can be made to intercept flood waters for use as water supply and flow augmentation later in the year. Also, excess flows can be pumped to off-stream reservoirs during off-peak electrical demand periods

(*Continued on Page 12*)

VIETNAM: HOW MUCH HEAT AT HOME?

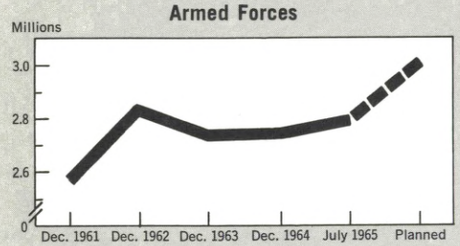
So far the Vietnam buildup ordered by the President apparently will funnel an extra $3 or $4 billion into the war effort between now and the second quarter of 1966. Moreover, more men will be added to the armed forces. An important question being asked at present is: whether or not the proposed degree of mobilization will strain the economy.

Net Change in National Defense Expenditures (Fiscal Years)



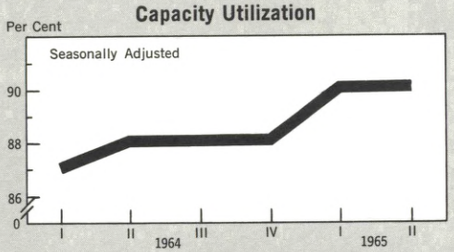
1. The additional $3-4 billion going into military spending during fiscal 1966 will result in an upward shift in defense spending.

Armed Forces



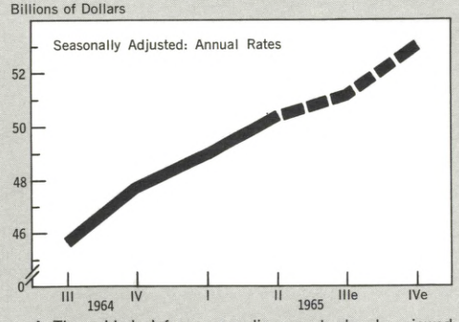
2. And the expansion of the armed forces by 340,000 men will raise the total bearing arms to about 3.0 million.

Capacity Utilization



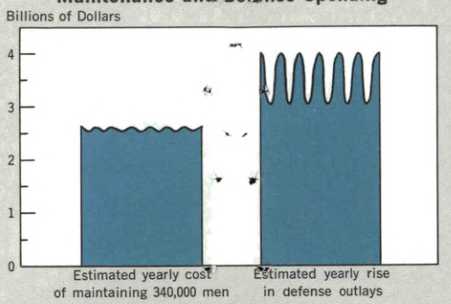
3. With respect to the capacity to meet the demands, the nation is in a relatively favorable situation to meet the limited requirements of the current mobilization program. The nation's manufacturing plants are presently working at about 90 per cent of capacity and the additional expenditures anticipated would amount to less than 1 per cent of the current rate of national output and would scarcely dent the existing rate of utilization. Moreover, the pervasiveness of excess capacity among the various industry groups appears to be sufficient to prevent serious "bottlenecks" from developing.

Plant and Equipment Expenditures



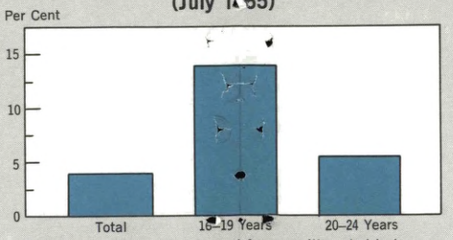
4. The added defense spending must also be viewed against a record rate of capital spending which will make even more industrial capacity available.

Maintenance and Defense Spending



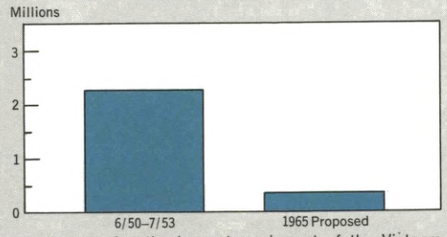
5. Another factor to be considered is that a large portion of the increase in defense outlays will represent merely the shifting of spending rather than a net addition. The increase of 340,000 men in the armed forces had to be fed, housed, clothed, etc. in civilian life.

Male Unemployment Rate—By Age Groups (July 1965)



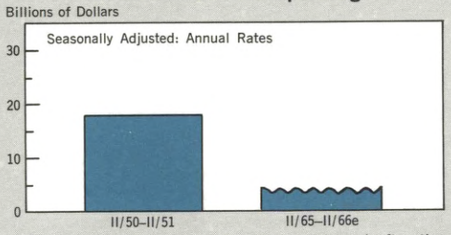
6. The increase in the armed forces will probably have a minimum impact on labor markets. Most of those who will be drafted are in the age brackets which possess few developed skills and where unemployment is high.

Increase in the Armed Forces



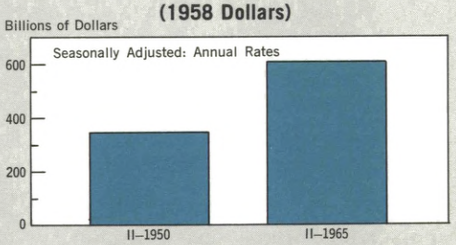
7. In assessing the longer-term impact of the Vietnam hostilities, the differences between now and Korea must be kept in mind. The armed forces were in a low state of preparedness then and were increased by over 2 million.

Increase in Defense Spending



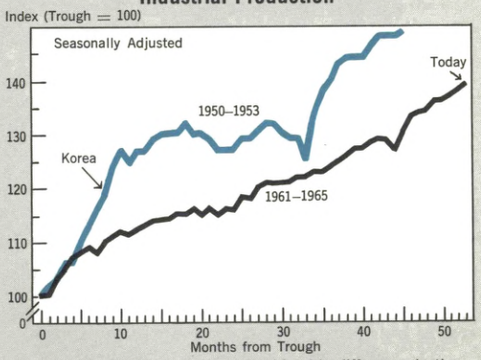
8. Defense spending was relatively small and after the war broke out, increased almost $20 billion, on a G.N.P. basis, in one year and around $40 billion in three years.

Real Gross National Product (1958 Dollars)



9. And all of this was imposed on an economy producing only 58 per cent as much in real goods and services as we are producing today.

Industrial Production



10. In addition, there is a considerable difference in timing. As can be seen on the cycle for industrial production, back in 1950 the economy was at the beginning of a recovery, typically a period of very vigorous business expansion; today we are in the 55th month of business expansion.

(*Continued from Page 9*)

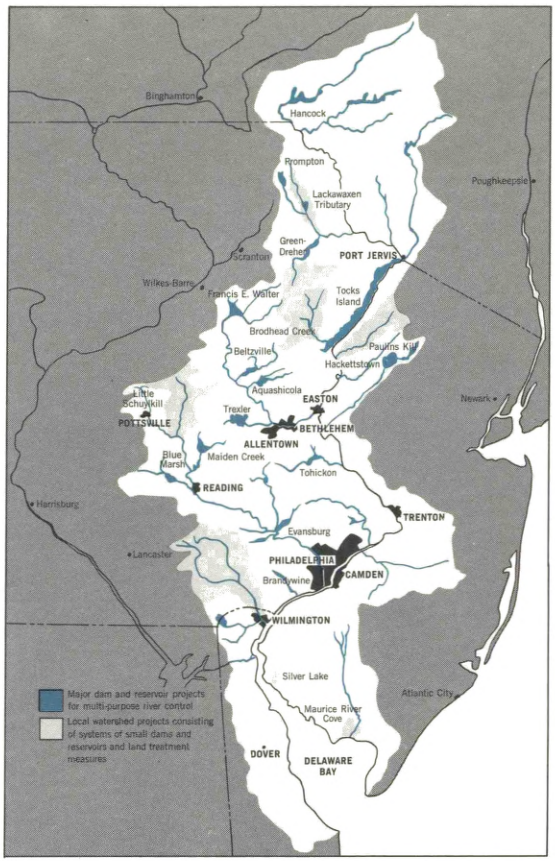
and released again to produce hydro-electric power during peak demand periods. Through the use of computers, it is now possible to develop an efficient, integrated plan for operating all projects in a river system."

Effective operation of the river system also requires some long-range planning, and the Commission at the outset designed a comprehensive plan for the orderly development of the water resources of the 12,750-square-mile Basin. The major components of the comprehensive plan, shown in the illustration, are:

1. Ten multi-purpose reservoir projects—six with flood control by the Federal Government, four non-federal water supply and recreation.
2. Enlargement of two federal flood-control dams for water supply and recreation.
3. Completion of the Cannonsville water-supply reservoir for New York City.
4. Eight local watershed programs consisting of dams and reservoirs and land-treatment measures.
5. Water-quality standards, interstate cost-sharing policy for water supply in federal reservoirs, policy for protecting ground-water resources (rich in the lower Basin).

In the performance of its manifold duties, the Commission utilizes the assistance of numerous other agencies. For example, the Commission has had the help of the United States Geological Survey in compiling basic data on precipitation, surface runoff, and ground-water conditions of the Basin. The United States Public Health Service is at present engaged in making a comprehensive study of the Delaware Estuary to ascertain the cause-and-effect relationships of pollution, the economic relationships between water and water treatment, and water use in the

DELAWARE RIVER BASIN COMMISSION
COMPREHENSIVE PLAN



86-mile stretch of the river between Trenton and Delaware Bay.

As if all these duties were not enough to keep it busy, the Commission is also called upon frequently to pass on applications for public and private projects such as water-supply installations, waste-treatment operations, watershed developments, or requests to span the Delaware with pipelines, bridges, or ferry routes.

D.R.B.C. to the rescue

On July 7, the Delaware River Basin Commission called a drought emergency meeting in

Philadelphia to consider what might be done about the diminishing reserves of Basin waters. Attending the meeting were more than a score of witnesses representing in-Basin and out-Basin municipalities, water and sewer authorities, industrial concerns, and utilities—all deeply concerned about the threatening shortage and impurity of water incident to the drought. Among the leading witnesses were New York's Armand D'Angelo, Commissioner, Department of Water Supply, Gas, and Electricity, who cited the impending peril of the rapidly receding water levels in the city's reservoirs; and Philadelphia's Samuel Baxter, Commissioner and Chief Engineer of the Philadelphia Water Department, who pointed out the menace of salt water creeping up the Delaware and threatening the Torresdale intake—the source of half the city's water supply.

The Commission declared a 30-day state of emergency, recognizing, among other things, the current hydrologic impossibility of New York City's continued adherence to the Supreme Court's 1954 decree; and ruled (1) that New York City be required to provide at least a part of the flow at Montague, not to exceed a definite amount specified in mgd's; (2) ordered releases of water impounded by the Pennsylvania Power & Light Company's Lake Wallenpaupack Dam, and from the Mongaup Reservoir of the Orange & Rockland Utilities in order to protect the health, safety, and welfare of the people in the lower Delaware Basin.

On August 6, the Commission met again in Philadelphia in response to New York City's fears of running out of water and Philadelphia's apprehensions of the approaching salt line. In recognition of the aggravated emergency, the Commission extended its previous rulings for an additional period and ruled that releases of water be made also from the Cannonsville Reservoir to counteract the encroaching salt water with a stronger flow of fresh water.

Subsequent to a Presidential task force report on the growing danger of the water famine in the Delaware Basin and Interior Secretary Udall's statement that New York and Philadelphia were on a collision course, the Commission made still further redistribution of the Basin's dwindling water supplies at its August 18 meeting in Washington. The Commission authorized New York City to stop making any downstream releases from storage in its three Delaware River Basin reservoirs after September 7, and to collect the inflow into these reservoirs as a "water bank"—the "bank" to be distributed, by the Commission, as needed between New York City and downstream areas. Also, after September 7, releases of water from Lake Wallenpaupack in Wayne and Pike counties and from the Orange & Rockland Utilities reservoir in Sullivan County, New York, are to be more than doubled to compensate for upstream waters withheld for New York City from their Pepacton, Neversink, and Cannonsville reservoirs, as well as waters to be withheld from the Francis E. Walter Reservoir, a flood-control installation in the upper Lehigh Valley. All these redispositions effective on September 7 were designed to increase downstream releases of water by 42 per cent.

Philadelphia was given specific assistance in the form of a federal grant of $250,000 to provide overtime money to speed up construction of a new intake above Torresdale. If that is done and if the drought does not become more severe salinity effects can be reduced.

The entire Basin's countryside is being scoured for all available lakes and ponds. Water from Lake Hopatcong within the Basin is being

sought by parched North Jersey cities outside the Basin. For lack of water at least one paper mill in North Jersey had to close down, resulting in the loss of jobs for several hundred workers.

For the duration of the drought, the Commission is limited to equitable distribution of all available waters within its jurisdiction. It can perform no miracles. When the Commission was established no one knew that the early stages of a marathon drought were also in the making. But for the progress in the Commission's comprehensive plan, our present plight would be even worse.

Water and waterworks

Successive cycles of water shortage are growing more acute. With expanding population, the demand for water in the Basin's service area keeps growing; but the river doesn't. It is a credit to the foresight of the Commission that it embarked, at the very outset, upon a long-range plan for more effective utilization of water resources. The essence of the plan is making more water available for use by providing more waterworks—facilities to capture excess waters in times of plenty for release in times of scarcity.

Facilities for water treatment also play a prominent part in water supply. Philadelphia, almost wholly dependent upon the Delaware and its tributaries for its water requirements, has no alternative. The city's purification plants make these waters potable, for which its consumers pay a price. It is only natural that Philadelphians, now menaced by a salt intrusion hazard, wonder why New York, on the Hudson, doesn't use its waters as Philadelphia uses those of the Delaware.

Desalinization of seawater, so unlimited in abundance, has nothing to offer as a quick solution. It would take years to build a plant with the necessary transmission facilities, and river water can still be purified at substantially lower cost than desalting seawater.

The Corps of Engineers, in their comprehensive "Delaware River Basin Report" of 1960 said that there was sufficient water in the Basin to meet existing and future needs as far as the year 2010, including the diversion for New York provided in the Supreme Court decree. Fuller utilization of the water resources, however, requires construction of adequate facilities, also outlined in the Engineers' report. The present drought indicates the need for revision of the time schedule and perhaps the construction details. The task under the supervision of the Delaware River Basin Commission promises to be the best way to run a river.

THE SEVENTIES BELONG TO THE SUSQUEHANNA

In the same month that President Kennedy signed into being the Delaware River Basin Commission, Congress authorized a comprehensive survey of the Third Federal Reserve District's other major water source, the Susquehanna River. Unlike that of the Delaware, the service area of the Susquehanna in Pennsylvania—21,000 square miles, almost half the land mass of the Commonwealth—is sparsely populated. Two-thirds of its 39 mid-state counties are rural, contain fewer than 100 persons per square mile. Less than 10 per cent of the water withdrawn from the Susquehanna and its tributaries is used for public purposes. Large tracts of land in the Susquehanna Basin in Pennsylvania are state-owned, and are undeveloped; highway access to much of the Basin is at present limited. These conditions permit planning for the future that can maximize utilization of resources in the Basin yet minimize dislocation of existing structures and customs.

That shining river

Robert Louis Stevenson describes his first glimpse of the Susquehanna River in *Across the Plains*: "And when I had asked the name of the river from the brakeman, and heard that it was called the Susquehanna, the beauty of the name seemed to be part and parcel of the beauty of the land. . . . That was the name, as no other could be, for that shining river and desirable valley." The euphony that enchanted Stevenson was mere accident, however. The Andaste Indians named the river by combining their words "sisku" and "hanne." Literally translated, they mean "muddy river."

In its 448-mile course—24th longest river in the United States—the Susquehanna is shining, is muddy, and more. Its north branch begins in Lake Otsego, New York, near Cooperstown, renowned now as site of baseball's Hall of Fame. As if to legitimatize its birth, the river first loops into Susquehanna County, Pennsylvania, then returns to New York State. It flows westerly past industrial Binghamton and Endicott, whereupon it once more crosses the state line at Sayre, Bradford County. Here the Susquehanna is joined by the Chemung River.

Reinforced by the Chemung, the Susquehanna channels southeasterly through rugged game and timber country to the great hard coal fields of Lackawanna and Luzerne Counties. At West Pittston the Susquehanna meets the Lackawanna River. It then turns southwesterly, courses through gently rolling terrain to Northumberland, just north of Sunbury, where it connects with its west branch.

The west branch rises near Cresson, Cambria County, in a soft coal region. It runs through truck and dairy farms to Clearfield, then east through state park areas to industrial Williamsport. Here it swings south, passes the federal penitentiary at Lewisburg, to its confluence with the north branch. At Clarks Ferry, the main stem of the Susquehanna unites with another of its principal tributaries, the Juniata River. Much of the land through which the Juniata flows is similar to that of the west branch—farmland, mineral deposits, recreational areas.

Now the character of the Susquehanna changes; so does the economy of the valley

through which it flows. It streams past the urban complex of Harrisburg-New Cumberland-Steelton, state capital, Army depot, steel mills. It splits York and Lancaster counties, each with its immensely valuable farmland, diversified industry, and swelling populations. It leaves Pennsylvania by crossing the Mason and Dixon Line near Peach Bottom, locale of an atomic reactor power generating plant. It supplies Maryland's hydroelectric Conowingo Dam, then empties into Chesapeake Bay at Havre de Grace, some 40 miles northeast of Baltimore.

Problems and potentials

The foregoing five-paragraph trip down the Susquehanna but hints at the diverse topography the river traverses and the full range of developing and undeveloped communities it serves. There are booming metropolitan centers whose industrialization, from basic industry to light manufacturing, is forging ahead. There are depressed areas, particularly those whose mineral or forest resources have been depleted or are no longer profitable to exploit. There are many fine colleges, and one-room schoolhouses. There are fruit farms, tobacco farms, crop farms, dairy farms, some incomparably successful, some marginally subsisting. There are great reaches of unspoiled public land where fish and game abound, there are congested areas where people abound. There are power and transport in abundance, yet kerosene lamps and log roads. There is affluence, and there is poverty. Possibly nowhere else in the United States is the varied national economy so well-mirrored in miniature.

There are problems, too, some directly related to water. In years of regular rainfall such problems tend to be overlooked, for normally Pennsylvania is a water-rich state: her average annual precipitation of 42 inches exceeds the national average by almost 40 per cent, her 4,400 rivers and streams number more than those in any other state. Few communities along the Susquehanna tap the river for public water supply, however. When drought occurs there is quick, local interest in the Susquehanna as a source of water supply. But potential is one thing, means of delivery another. Filtration plants, pumping stations, water and sewer lines are nonexistent and cannot be built in time to cope with immediate need.

Pennsylvania is confronted with water-related problems other than that of supply. Its anthracite and bituminous coal mines have created a kind of water pollution particularly serious in the Commonwealth—infusion of poisonous sulphuric acid, deadly to man, fish, and plant life. Soil erosion takes a heavy toll: a study reveals that from March 31 to April 8, 1960, almost two million tons of silt were carried past Harrisburg by the Susquehanna, equivalent to the topsoil of a 40-acre farm being lost every six hours. Floods can be devastating: one in March, 1936, inundated 15,000 acres in the Pennsylvania Susquehanna Basin, affected more than 450,000 people.

More important than mere resolution of water problems in the Susquehanna region is realization of the potentials inherent in integrated development of its water and related land resources. The Susquehanna Basin is more than twice the size of the Delaware Basin, but has only half as many people; it offers room for growth. Population in the Pennsylvania sector of the Basin has been rising—between 1950 and 1960 it grew by 10.3 per cent, which compares favorably with the state's increase of 7.8 per cent. But the growth has been uneven. The already populous Harrisburg-York-Lancaster area posted a rise of 17 per cent, whereas the upper

river counties (principal cities Scranton, Wilkes-Barre) and the Juniata Branch counties (principal city Altoona) lost 6.5 per cent.

Water supply had little effect on the disparate changes in population; other factors affecting employment played major roles. In the growth area of Harrisburg-York-Lancaster, employment gains between 1950 and 1960 were greatest in the fields of government, finance, services, wholesale and retail trade, and electrical equipment, none of which is particularly water-oriented. Declining demand for hard coal, thus fewer jobs in mining, was primarily causative of the population loss in the Scranton-Wilkes-Barre area. Altoona suffered a sizable decline in employment in its transportation industry, railroading. Water had little to do with either.

Water, however, together with simultaneous advance of other facilities, can do much to aid growth of the Susquehanna Basin. The area looks to two kinds of growth, industrial and recreational. Industries such as pulp and paper mills, steel mills, food processing plants, chemical manufactories, and others dependent upon abundant, potable water, will find many suitable sites in central Pennsylvania. Camping areas, game preserves, streams plentiful with mountain trout, and just the sheer beauty of unsullied Nature, will attract tourists in increasing number, and generate employment in service industries. Together, industry and recreational facilities can promote growth of the Susquehanna Basin.

Federal Government's role

When the Congress in 1961 directed the Corps of Engineers to prepare "a comprehensive plan for the development of water and related land resources" in the Susquehanna Basin, it recognized the essentiality of simultaneous development of the Basin's several natural resources. Too often in the past, one resource was exploited without regard to the effect on another resource; a telling example is coal mining, which has contributed to acid pollution of over 2,000 miles of Pennsylvania's streams. Single-purpose development has ignored latent possibilities—a dam built solely for flood control purposes might also have served to generate power, provide swimming and boating facilities, and hold water in reserve for times of drought, had it been constructed with these collateral purposes in view.

To aid the Corps of Engineers prepare a plan that would encompass integrated development of the several resources of the Susquehanna Basin, the Congress also authorized other agencies of the Federal Government to make related studies. There are now seven principal U. S. instrumentalities engaged in the survey. Together with their main spheres of interest, they are:

Corps of Engineers (Department of Defense)—flood damage prevention and control

Department of Agriculture—resource factors in tributary areas of the Basin

Department of Commerce—flood forecasting, federal aid highways

Department of Health-Education-Welfare—water quality, economics related to water resources

Department of Interior—recreation, fish and game, coal resources and acid mine drainage pollution, geological factors

Federal Power Commission—matters incidental to hydropower

Housing and Home Finance Agency—public works, urban renewal

The various federal agencies and sub-agencies, 16 in all, have some common interests, and are

generating data useful to each other. To minimize duplication of effort and to promote exchange of information, they have constituted a Susquehanna River Basin Study Coordinating Committee. Each agency, and each of the Basin states—Pennsylvania, New York, Maryland—is represented on the committee. Meetings of the committee are open to press and public, and thus the public is kept informed about progress of the survey.

State government's role

Thirteen agencies of the Commonwealth of Pennsylvania have specific interests or responsibilities in administration, research and planning, control, and development of the state's natural resources. They are the Departments of Agriculture, Commerce, Forest and Waters, Health, Highways, and Mines and Mineral Industries; the General State Authority, and the State Planning Board; the Fish, Game, and Public Utility Commissions; the Sanitary Water Board, and the Water and Power Resources Board. Additionally, the Department of Internal Affairs has a general interest in the state's resources, as they relate to the Susquehanna Basin.

Inevitably, there is an overlapping of agency responsibilities in given aspects of resource development. In a few instances, coordination between agencies is provided for by statute; in most cases, however, there is no statutory mandate, and voluntary liaison has evolved.

Interstate Advisory Committee

Pennsylvania, New York, and Maryland have a measure of direct participation in the Susquehanna survey via their representation on the federal agencies' Study Coordinating Committee. In order to safeguard their interests further, and to promote liaison between themselves, the Basin states set up an Interstate Advisory Committee on the Susquehanna River Basin. Each state is equally represented on this committee, which has a full-time director and a small staff. The chairman and two vice chairmen of the Advisory Committee are the state's official representatives on the (federal) Study Coordinating Committee.

The Advisory Committee is charged with a second responsibility, to conduct studies relating to the Basin which do not come within the scope of activities of participating federal and state agencies. One such study resulted in a series of organizational charts delineating the interrelationships among the numerous federal and state agencies engaged in the survey.

A third duty of the Advisory Committee is to draft an inter-governmental compact under which an action program for the Susquehanna Basin may be carried out. A beginning draft of this compact has been prepared. It is similar in some respects to the compact that created the Delaware River Basin Commission and, like the compact, must be approved by the affected states and the Congress, and signed by the President, to become operative.

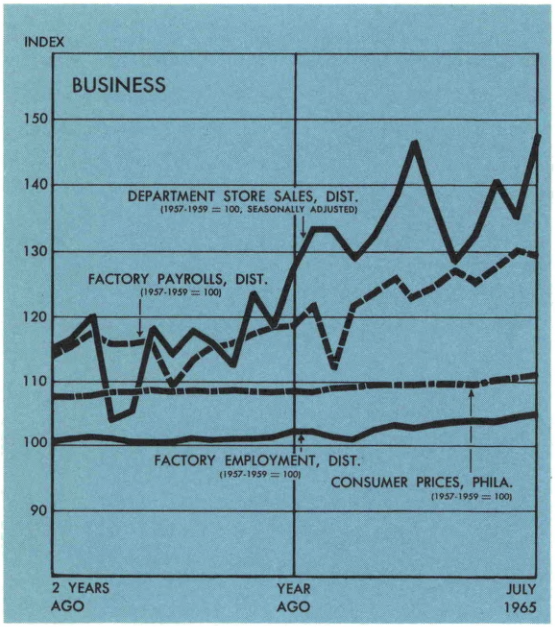
Timetable

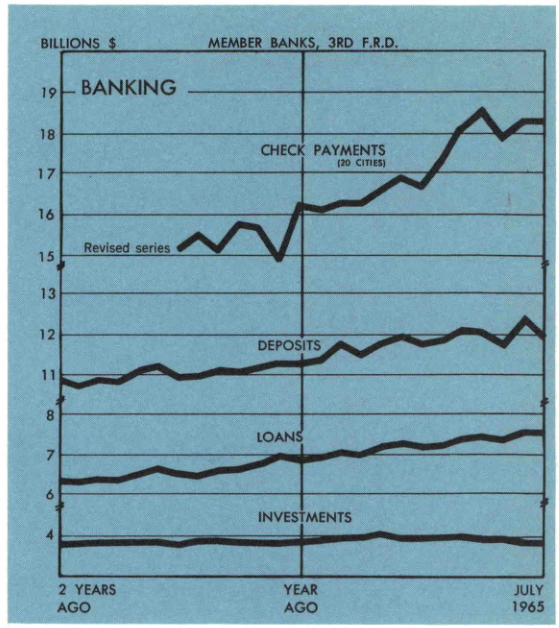
It is anticipated that survey of the Susquehanna will be completed by 1968 or 1969. In the interim, legislatures of the three states will be asked to approve a compact to undertake joint action to develop the Susquehanna River Basin. By the time survey and compact are in being, interstate route numbers 80, 81, 83 and 84 will have made the Pennsylvania Susquehanna Basin accessible to all points of the compass. There will then remain one more obstacle to be overcome by the interested parties: appropriation of federal and state funds to implement the

master plan for development of the Basin.

Economists coined a catchword to describe the present decade for the nation—"The Soaring Sixties." Paraphrasing this for the Susquehanna, these ten years can be described aptly as the "Searching Sixties." They will see the end of the first phase of an ambitious endeavor to develop the Susquehanna Basin's land, labor, power, raw materials, educational plant, and transportation facilities, jointly with its water resources. Should plans now formulated come to fruition, Pennsylvania's slogan for the next decade could well be, "The Seventies Belong to the Susquehanna."

FOR THE RECORD...





SUMMARY

	Third Federal Reserve District			United States		
	Per cent change			Per cent change		
	July 1965 from		7 mos. 1965 from year ago	July 1965 from		7 mos. 1965 from year ago
	mo. ago	year ago		mo. ago	year ago	
MANUFACTURING						
Production	....	....	....	− 5	+ 9	+ 9
Electric power consumed	− 2	+ 8	+ 9	....	....	....
Man-hours, total*	− 1	+ 7	+ 7	....	....	....
Employment, total	0	+ 4	+ 4	....	....	....
Wage income*	− 1	+10	+10	....	....	....
CONSTRUCTION**	+ 4	+ 8	+15	+ 4	+ 4	+ 2
COAL PRODUCTION	−13	+18	+ 6	−23	+17	+ 8
TRADE***						
Department store sales	+ 9	+ 1	+ 4	....	....	....
Department store stocks	....	....	....	....	....	....
BANKING (All member banks)						
Deposits	− 3	+ 6	+ 8	− 3	+ 9	+10
Loans	0	+11	+11	− 1	+14	+14
Investments	− 1	+ 1	+ 2	0	+ 4	+ 3
U.S. Govt. securities	− 1	− 7	− 5	− 1	− 5	− 4
Other	0	+15	+14	+ 1	+17	+14
Check payments	0†	+13†	+13†	0	+10	+11
PRICES						
Wholesale	....	....	....	0	+ 2	+ 1
Consumer	0‡	+ 2‡	+ 2‡	0	+ 2	+ 1

*Production workers only
**Value of contracts
***Adjusted for seasonal variation

†20 Cities
‡Philadelphia

LOCAL CHANGES

	Factory*							
	Employment		Payrolls		Department Store Sales†		Check Payments*	
	Per cent change JULY '65 from		Per cent change JULY '65 from		Per cent change JULY '65 from		Per cent change JULY '65 from	
	mo. ago	year ago	mo. ago	year ago	mo. ago	year ago	mo. ago	year ago
Lehigh Valley	0	+ 6	− 1	+ 9	....	....	+ 5	+20
Harrisburg	+ 2	+ 2	− 2	+ 4	....	....	+ 3	+27
Lancaster	0	+ 5	− 1	+ 8	+10	+ 6	+ 2	+16
Philadelphia	0	+ 3	+ 1	+10	+10	− 2	− 1	+ 8
Reading	− 1	+ 5	− 5	+ 8	+13	+ 6	+ 2	+ 7
Scranton	+ 1	+ 3	+ 1	+ 8	+ 4	+ 1	+ 9	+ 8
Trenton	− 1	+ 3	0	+ 6	+12	− 4	− 3	+16
Wilkes-Barre	− 1	+ 2	− 1	+ 5	+ 3	+ 6	− 3	+14
Wilmington	0	+ 4	+ 1	+ 7	+10	+14	+ 5	+39
York	+ 1	+ 6	− 2	+12	+ 8	+ 9	+ 1	+13

*Not restricted to corporate limits of cities but covers areas of one or more counties.
†Adjusted for seasonal variation.