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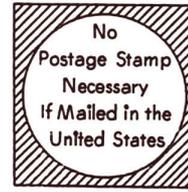
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JULY/AUGUST 1967

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art

DORE ASHTON

I am always irritated by a certain phrase common to political rhetoric and cultural commentary. It usually occurs when the author is about to dismiss an unwieldy subject, and goes like this: "We live in an age that . . ." What follows is most often an allusion to the chaos, industrial progress and political upheaval which makes an assessment of our "age" almost impossible. And so it is dismissed.

In criticism, the phrase, or at least the attitude it represents, occurs frequently when the subject of modern sculpture is treated. There is a paucity of serious sculpture criticism, although there is an abundance of topical documentation. We-live-in-an-age-that . . . is admittedly purely experimental. But even the experimental mental set has its causes. Most sculpture critics never attempt to see our "age" in relation to previous ages. They are content to characterize its products in the shadowless noonday light of the present.

One of the few sculpture essays I have come across that comes to grips with the long view — that uses the distancing so important to criticism—appears in *Sculpture 19th and 20th Centuries* recently published by the New York Graphic Society. The author, Fred Licht, a professor at Brown University, points out that sculpture was religious in origin and was therefore communal in previous eras. Professor Licht believes that sculpture always tends toward the monumental and is therefore "the logical and primary form of expression solely in those epochs or in those cultures in which a firm religious as well as social structure is adhered to by everyone."

Obviously, the modern era cannot fulfill these requirements, and it is on this theme that Licht offers his most penetrating insights. He notes that of the three commissioners of public sculpture in the past—the church, the state and the private sponsor—not one has succeeded in our century in sustaining the monumental tradition. For example, the state these days has difficulty finding heroes or events or principles to which monuments could be erected. He recalls the sad history of the Unknown Political Prisoner competition which ended, as he says, in a checkmate. "Placed between the equally distasteful possibilities either of doing violence to his artistic convictions or to the memory of the victims he is to commemorate, the great sculptor today prefers to leave such traditional and important subjects aside." One huge area of traditional monumental sculpture is thus unusable in the modern era.

When the modern state does indulge in such commissions, the results are inevitably depressing. (I think of "Raising the Flag on Iwo Jima" which I recently heard described by a school superintendent as a suitable art object to introduce school children to culture.) Professor Licht briefly discusses the rise of academicism in the 19th century and its natural exploitation by the state, and then offers the only cogent appraisal of a very important subject—Fascist art—that I have seen. He is quite right to insist that the 20th century cannot be seen in proper perspective without this dismal but substantial chapter in art history.

The most radical and widespread expression of official art, he says, is furnished to us by the Fascist style which gathered momentum in the 20s and 30s to such a degree that it can be called an international style. Wherever art was publicly sponsored during those years, the Fascist imprint was felt.

The Fascist experience itself is of interest because it began not with a tradition-bound academy but with the revolutionary

4 Futurist movement:

"Carefully vitiating all those basic principles of Futurism which spoke for the right of the artist to propose new visions of the world and of man, Fascism kept intact only the magnificent, surging form of Futurist sculpture, and having once assured itself of possession of an admired and admirable contemporary style slowly distorted it towards its own propagandistic ends . . . The petrified fury which shakes the figures of Fascist monuments is the most graphic illustration of the regimentation which the country suffered to be imposed on it. Armies with nowhere to go, energies which are hurled against no visible enemy, the whole waste and senselessness of the Fascist programme is inherent in these sculptures, which are fascinating as they are repulsive but which also express a national state of mind with an uncanny precision . . ."

Implicit is a warning: our own avant-garde is easily accessible to the state, and its teeth may easily be knocked out if things go on the way they are. (The state being identifiable as an "image" these days, the "image" can easily take over art in its image. I can imagine a P.R. man in government employ announcing, "L'état, c'est moi.")

Returning to Professor Licht's premise: the progressive secularization of sculpture presents the artist with a novel situation.



From left to right:

"The Sea," 1966, white Italian marble; L.7'6".

"Little She" Photo by Geoffrey Clements—Courtesy Cordier & Eskstrom Inc.

"Green Essence" Photo by Geoffrey Clements—Courtesy Cordier & Eskstrom Inc.

"Rockabye" Photo by Geoffrey Clements—Courtesy Cordier & Eskstrom Inc.

"With the material world having become aggressive under the impulses it receives from mechanization and secularization," sheer matter dominates rather than serves man. Secularization occurs not only in concepts, but in forms as well, coming to logical conclusion in the work of Duchamp. "If there is no hierarchy of values, one form is as valid as another. We come to the total democratization of form which Duchamp sardonically presents to us in his ready-mades."

It is this total democratization of form which I think dominates sculptural thinking today. The admiration for instability, impermanence, and, to some degree, impertinence, dominates the taste of artists and public alike. In itself, the tendency to experiment with fleeting or unstable values and non-hierarchical formal approaches is not worrisome. What is disturbing is the reckless squandering of inherited values; values that might still conceivably be called eternal.

Despite our coming of age in many ways, Americans still labor under the frontier delusion that what is large, robust, defiant and, as the barkers say, never seen before, is necessarily what is

important. We are wary of beauty and refinement and tend to dismiss the subtle with such condescending adjectives as "bland." This, at least, is how the *New York Times* saw the recent exhibition of Isamu Noguchi's stone sculpture at the Cordier-Ekström Gallery.

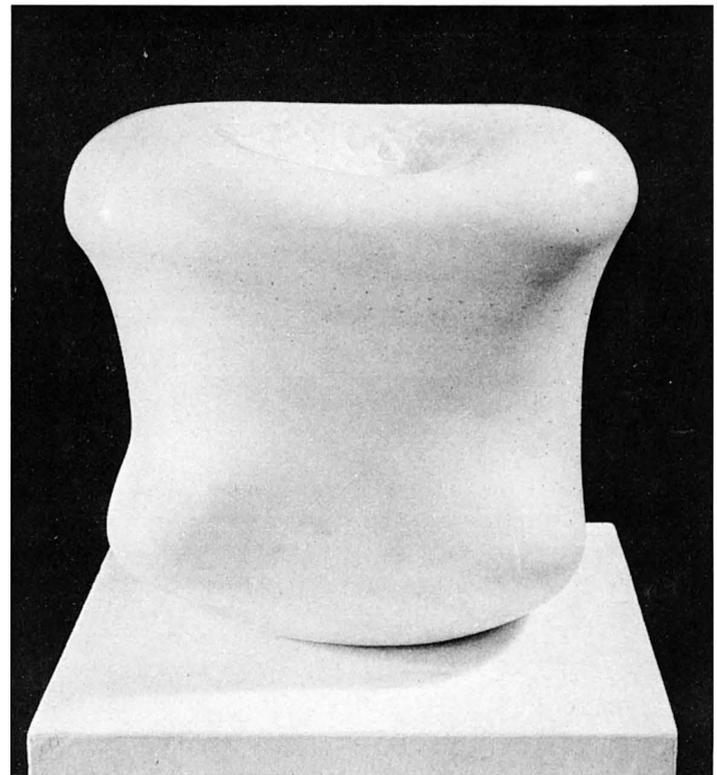
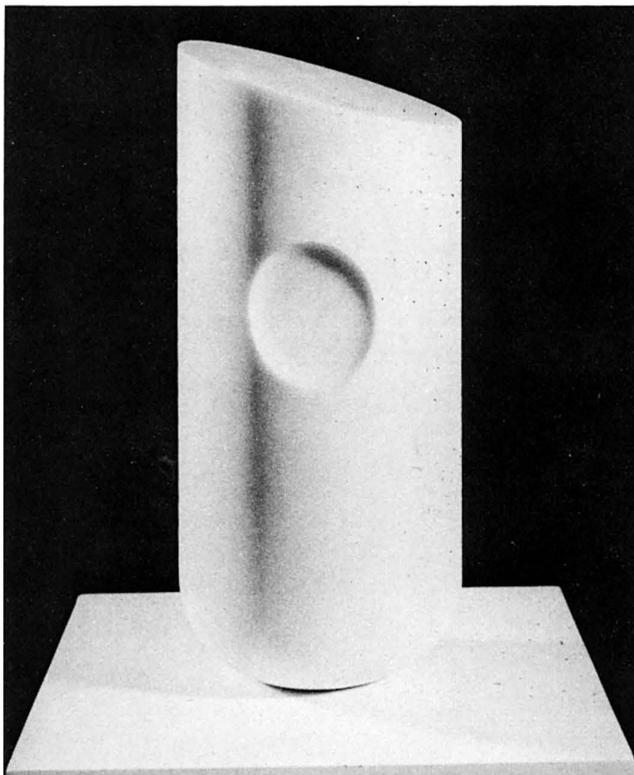
Noguchi is often reproached for his superb craftsmanship, which is another way of reproaching him for his very mode of feeling. For Noguchi has manfully accepted the mandate of a significant modern tradition, shaped largely by Brancusi, and has preserved values which I would imagine will remain long after the yearly experiments of the 1960's, celebrated and praised in overblown rhetoric, will have been buried.

In a sense, Noguchi is no more advanced than a 10th-century Chinese sculptor, no more original than a pre-Columbian potter, no more moving than the author of an archaic Cycladic figure, no more sensuous than an East Indian carver, and no more bound to his moment, either. Noguchi is dealing with what Paul Klee mysteriously called the pre-history of the visible. He goes to stone, or any other material with the intention of feeling out its qualities, its internal structure, is total history. He is searching for the purest visual description of the characteristics he senses in his material. Surfaces for Noguchi are not merely

is specific, yet the anthropomorphic allusion is inescapable. But the piece is also a beautiful reminder of the inherent loveliness of stone. It is modulated to bring out the perfect equilibrium of shadow and high surface. It is gouged just enough to recall its hard, rough, unyielding original state. It is a small and perfect statement of sensuous plenitude—precisely the subtle, quiet kind of statement that escapes the notice of critics, or else brings out the epithet "bland."

By contrast, Noguchi shows several pieces in which the roughness of his matter is of primary importance. One is a cascade of green stone propped against a steel sheet. The stone is partially polished as if to stress the disparity between the natural and the man-made. The awkward balance of prop and heavy stone further emphasizes a dialectic interpretation (which by the way has been one of the problems Noguchi has approached repeatedly in the past 20 years).

Far from bland is Noguchi's choice of stone and treatment. There were a few pieces in this exhibition carved from a pink stone that could not be more suggestively sensuous—even sensual—and in which there is an authentic shock value for those imaginative enough to be shocked. With an uncanny precision, Noguchi manages to make his relatively abstract pink



there to be embellished with high craftsmanship and sleight-of-experienced-hand, but to tell the final story of an internal structure that can be sensed but not ever seen. His shaping impulse is a force which has no name, but which can be sensed in certain sculptures throughout the history of art. If contemporary sculpture critics would only dally long enough to ponder the value of Noguchi's relentless search for formal precision, and if they would only concede the abiding importance of the shaping hand that responds to experience sensuously first, and only after, conceptually, they might discover that Noguchi is one of the few durable masters we have produced.

It is all very well to recognize that matter is energy, but it is also experienced as solid, hard or soft, aged or young, bulky, and fragile. Noguchi is a master in speaking of matter, reminding us of its ineluctable solid presence. He also speaks of the shapes matter may take when tamed by a sculptor's imagination. In this exhibition, there was a modest little piece, "Rockabye" that in its form combines a reference to the ancient mortar and a reference to the female form. Neither reference

sculptures into erotic symbols. Their smooth surfaces are calculated to rouse physical response, while their color, deftly emphasized in modulated polishing and some matte contrast, is Rubensian to an almost salacious point.

Ultimately, I believe Noguchi will be celebrated as one of our great American sculptors, not for his originality, but for his heroic conservation of necessary values. (I don't mean that Noguchi is not original: he is original in the only significant sense, namely, that his work originates with deep feeling, and is consummated without losing the indefinable sense of its deep origins.)

It can be said of Noguchi, as Professor Licht says of Noguchi's teacher, Brancusi, that his work is concerned with the universal powers of death, rebirth, fertility and fallowness. Consequently, "most of his sculptures fulfill the functions of both the flower and the seed."

I hope we have not lost the sense of life which can recognize the importance of these themes, their timelessness, and the nobility of the artist still willing to deal with them.

WATER RESOURCES IN NORTH AMERICA

This, the last issue of **Arts & Architecture** under its present direction, looks at the Water Problem in North America from a number of different points of view, only one of them architectural. If it strikes readers as strange that a journal of architecture and the arts should devote an issue to the single subject of water, there are several possible responses. It could be said that water is one of the most potent forces employed by Nature in shaping the animate and inanimate world, and as a form creator is thus within our province.

Or it might be said without further attempt at justifying the issue that it is of importance to note just how far man has progressed in his ability to form and deform his environment. Like water, he is both form giver and destroyer, but until quite recently man was one of Nature's relatively minor and inefficient tools and weapons. By his inventiveness and increase in numbers, however, he has become capable of changing the face and fortune of the world beyond the capacity of any other natural force. An indication of his increased capabilities is the catastrophic affect man has had on water in the U.S. It is estimated, for example, that if he were to disappear tomorrow, it would take a generation for the waters of even our largest rivers and lakes (e.g. the Hudson River, Lake Erie) to regenerate and become fresh again.

Not only have we made sewers out of our fresh water resources, but at a recent conference of the American Association for the Advancement of Science, a marine biologist reported that in Southern California waste is being poured into the Pacific in such quantities as to threaten the commercial and recreational values of the Santa Monica and San Pedro basins. Unreclaimed chemicals, hot industrial waste water, oil brine, sewage and other pollutants are destroying kelp beds, altering the ocean temperature locally, and otherwise radically changing the underwater environment, the ecology of the sea. "Animals are going to live there," it was said, "but they won't be the native animals."

Coming closer to the reasons for the issue, man's metabolism, the sum of his vital processes, is inextricably linked to that of

his environment; and if it ever was, architecture is no longer a question of habitation but of habitat. Through ignorance and venality, construction of habitation continues to result in destruction of our habitat. To repair the damage, there is urgent need for understanding and cooperation among architects, planners, developers, industry, government, social and physical scientists. Above all there is need for public awareness, interest and understanding of the complicated forces shaping and misshaping the environment.

To bring about a clearer understanding of the problems of our habitat and the efforts being made to solve them, there is need for a journal which focuses on all aspects of living and building in the new urbanized world. A journal which acts as a communicative link among the academic and professional groups concerned with the social and physical environment—most of which have their own specialized and often unreadably arcane publications—and more, between the specialists and the public. The best thinking of each must become part of the accumulated knowledge of all.

Such a magazine would devote itself to any and all subjects affecting or affected by habitat: Natural Ecology, Settlement Patterns, the Supercity and Urban Structure, Open Space, Transportation, Freeways—and Water. Not in isolation but as individual chapters in the story of the environment, showing the interaction of each upon all. We had hoped that A & A might become that journal but it is not to be.

This issue on water doesn't pretend to be a definitive treatment of the subject. A government catalog lists 2,046 water research projects active in 1965, 3,905 in 1966. There are doubtless even more this year. The continuing increase in research activity is in response to, and at the same time a measure of, the magnitude and urgency of the problem, which is only one of many, all rapidly passing through the crisis stage to the disaster point beyond. If this issue has any message, it is that our environmental problems can be met and overcome only by concerted rational effort backed by the active concern, support and sacrifice not just of the dedicated few but of the many. D.T.

THE SOUTHWEST'S WATER NEEDS

Dallas E. Cole, Chief Engineer,
Colorado River Board

The need of the Southwest for more water than the area produces is real, not fancied, and the need to start meaningful steps to do something about it is urgent. Some parts of the region are in bad straits now, notably central Arizona. The water deficiency region-wide is presently about 1.5 million acre-feet a year and is expected to grow rapidly as the population continues to increase and the economy to expand.

Water resource engineers have studied, and continue to study, the region's water supplies and water requirements all ways from Sunday, over and over, and they always come out with the same negative answer — not enough water to meet the projected needs. And their estimates of dependable supply include allowances for future increase in conservation and salvage of water and continued improvement in efficiency of use.

The region of water deficiency, defined roughly and somewhat arbitrarily for convenience, covers the entire Colorado River drainage area plus parts of the seven basin states outside the drainage area but which are or may be served with Colorado River water. It includes roughly the southern half of Wyoming, most of Colorado and Utah, all of Arizona, western New Mexico, southern Nevada and Southern California. Its area is about 350,000 square miles, its present population about 15 million, of which about 10 million are in Southern California. It includes such important population and industrial centers as Salt Lake City, Denver, Las Vegas, Phoenix, Tucson, Los Angeles and San Diego, all dependent upon the Colorado River system for all or portions of their water supplies. Total assessed valuation of the region runs into many billions of dollars, more than 20 billion in Southern California alone. Effects of the vast industrial complex of the area fan out over the earth, occasionally to the moon and to outer space. The region contains some five million acres of irrigated land, of which more than four million are irrigated with Colorado River system water. (Actually the area of water deficiency is larger than here defined, and includes probably all the Great Basin, all of New Mexico and part of the Great Plains region.)

The Southwest is the fastest growing region of the U.S. Its population has increased more than 85 percent since 1950, and there is no sign of let-up. It is expected to at least triple in the next half-century. The Southern Cali-

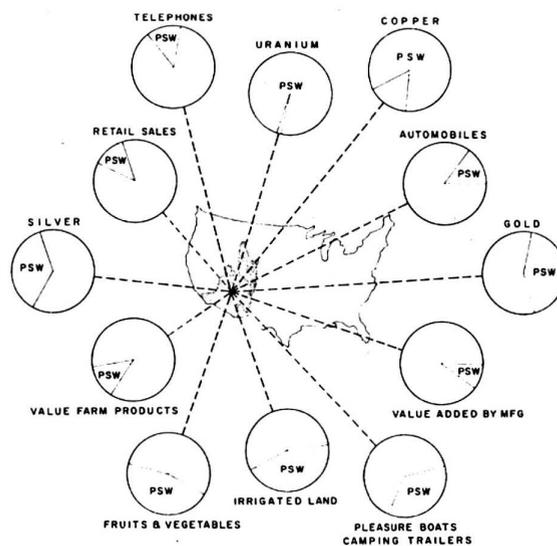
fornia coastal area will be almost completely urbanized, and farmlands will shrink accordingly. People keep moving to the Southwest, and must be provided with water for their homes, farms and factories, as well as for recreation. Water-oriented recreation is assuming greater and greater proportions, not only in the demands of the citizens but in many of the local economies.

The Southwest is rich in resources, except water, and exploitation of those resources is on the increase. The region accounts for 99 percent of the nation's domestic uranium production, and more than half its copper. Vast coal deposits are being developed, principally for generation of electricity. Many trillions of barrels of oil are present in shale deposits covering 16,500 square miles in Colorado, Utah and Wyoming; with exploitation on a significant scale expected to begin momentarily, and projected to reach 2 million barrels a day of petroleum by 1980. All this will require more water.

Irrigated agriculture and livestock raising are major elements of the area's economy. The seven Colorado River basin states produce within their boundaries more than five billion dollars' worth of crops and livestock annually, about one-sixth of the U.S. total. About a billion dollars of this comes from areas irrigated by Colorado River water.

Because of warm climate and long growing seasons the southern half of the Southwest is able to ship enormous quantities of fresh fruits and vegetables in the dead of winter to eastern markets. For example, at the height of the winter lettuce harvest, as many as 2800 carloads of this perishable crop are sent to market from the Imperial Valley, California, each month.

The nation simply cannot afford to let this vital segment of its economy go downhill for lack of water. Economic growth of each major region of the U.S. is interlocked into the continuing welfare and prosperity of the nation. To be convinced of this one has only to travel the broad reaches of the Southwest and see the dozens of trainloads and many thousands of truckloads of goods going in and out of the region each day of the year.



The largest and most important single source of water in the region is the Colorado River system. Its water nurtures the important agricultural economy, and its water and power are vital to the booming industrial

developments near the metropolitan centers and along the entire south coastal plain of California. Other sources are relatively small streams in the Great Basin in Utah and Nevada, and small coastal streams in Southern California, all inadequate to meet local demands.

The Colorado itself is rapidly approaching bankruptcy; some areas of the basin, most notably central Arizona, are already in the red. There the groundwater reserves, accumulated through the centuries by percolation from the Gila River system, which is tributary to the Colorado at Yuma, are being depleted at a rate of about 1.5 million acre-feet a year in excess of average recharge. Groundwater basins in Southern California are also being overdrawn, about half-a-million acre-feet a year, and would be depleted faster were it not for the water imported by Los Angeles from Owens River and by the Metropolitan Water District of Southern California from Colorado River.

The Colorado is the first major river system in the U.S. to become fully utilized. For the past decade, and before that only because of lack of storage which now exists to hold back flood waters, no appreciable quantities have flowed from the mouth of the river into the Gulf of California. Gila River at its mouth has been dry longer than that. So far the system has been able to supply the demands placed upon it, partly because of overdraft and partly because the upstream states have not yet developed to their full potential.

A 1922 interstate compact divided the use of the water as between the Upper and Lower Basins (the division point being at Lee Ferry on the main stream near the Utah-Arizona line), giving the Upper Basin the right to more water than it is now using, i.e., the right of recall. The Lower Basin projects, being more fully developed, are thus dependent to some extent on interim use of water that belongs to the Upper Basin. Moreover, the compact was negotiated on the basis of pre-1922 records which overestimated the dependable flow of the stream, and divided more water than is produced. To add to the problem, a 1944 U.S.-Mexico treaty burdens the river still more by guaranteeing Mexico 1.5 million acre-feet a year off the top.

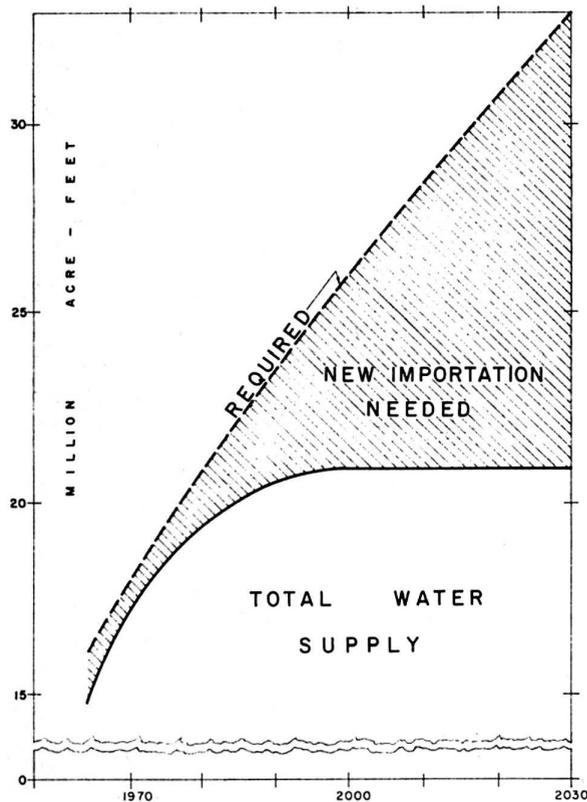
The compact also provides that the Upper Basin cannot deplete the flow at Lee Ferry below a stated total in any 10 years, and because of the diminishing average production of the stream system it is now apparent that the quantity of water recallable by the Upper Basin is not enough to meet its additional needs or to supply the amount apportioned by the compact. This is the reason why the Upper Basin states show no small concern over the proposal to build a new project to take more than a million acre-feet of water a year from the lower mainstream into central Arizona, where it is badly needed to help relieve the overdraft and help sustain the economy of the state. The quantity of water recallable by the Upper Basin would, however, cut drastically into the needs of existing Lower Basin projects. For this reason, California insists that legislation to authorize the Central Arizona Project provide protection of existing Lower Basin uses and require a meaningful intent to aug-

ment the water supply of the Colorado River system.

Corollary to the diminution of water quantity in the lower river is the accompanying deterioration of water quality; the two problems are inseparable. High in mineral content to begin with, the water in the Lower Basin is becoming more heavily burdened with dissolved solids as more water is consumed upstream, and the process will continue. Already there has been an international fracas with Mexico because Mexican farmers complained that the water delivered to them was so highly mineralized by drainage returns from U.S. irrigation that it was reducing crop yields and damaging soils below the border. The problem, temporarily alleviated by the quick U.S. construction of a drainage by-pass channel, is by no means settled.

American farmers in Arizona and California worry over the increasing salinity of the river water, and the accompanying increase in water requirements and costs. This problem threatens to aggravate the interstate and interbasin dissensions and could even mature into troublesome and costly litigation. The only way to avoid some such calamity, in the eyes of the water resources and water quality experts, is to dilute the river's salinity with water imported from a better source. Water shortage on the Colorado is inevitable, the only question being how soon? As a whole the Southwest is short now, and is living on overdrafts. Taken as a whole the Southwest needs at least 1.5 million acre-feet a year of supplemental water supply

Southwest water needs versus supply



right now; will need four or five million more within a few decades and possibly as much as another Colorado River eventually, in addition to the 2.5 million acre-feet a year that will arrive in Southern California from the north four or five years hence when the California Aqueduct is finished.

All these estimates take into account such considerations as continuing change from

agricultural to urban land use in certain areas, increased efficiency in irrigation, reduction of channel losses along streams and canals, and increased reclamation and reuse of sewage water. Further studies and improvements in technology can only refine the results of the supply-demand equation, not change the algebraic sign from minus to plus.

Some solution to the Southwest's distressing water problem has to be found and will be found. That much is inevitable, but just how it will be done is still a matter of argument. Let us examine some of the ideas that have occurred to various people about how to resolve the Southwest's water problem.

The idea of sending the people where the water is instead of transporting water, surely is not meant to be taken seriously. In this country people cannot be ordered to pull up their roots and move in great numbers to another region. If the authority were vested, many of us in the Southwest would be glad to send certain segments of the population elsewhere. But such authority vests in no one. By the same token, no one has the authority to keep people out of a state when they start to move in. That has been tried in California and the attempt declared unconstitutional. People migrate where they please, and when they get there must be watered as well as fed, housed, clothed, employed, and educated. They demand and are entitled to these necessities.

The notion of shifting large segments of our agriculture to where the water is cannot effectively solve the problem either, although it may take place in the course of time to some extent in response to economic pressures such as increasing demand for urban land. However, none of the well-watered areas of the west can match the tens of thousands of carloads of winter vegetables, fruits and melons, and of citrus, grapes and dates that are shipped each year from the magnificent farmlands of southeastern California and southern Arizona, where growing seasons are 365 days long and as many as three crops can be grown in a season on the same piece of land. Gross crop returns per acre from these lands are by far the highest in the world. Neither can other regions raise the enormous cotton crop which the Southwest produces. We need all the highly productive acreage we can get to help feed and clothe present and future generations. Irrigated acreage in wetter areas will increase, not to displace existing acreage but in response to increasing needs.

Some observers appear to believe sincerely that if the Southwest would husband its water resources more carefully and use its water more efficiently it could make do with what it has. Southwesterners do not agree. If Californians, for example, believed it the State would not be building its two billion dollar project to import into its central and southern areas more than four million acre-feet of water a year from northern California. Southwesterners are and always have been keenly aware of the need for conservation, salvage and efficient use of water. They have had to be. Southern California pioneered in the early 1900s in capturing storm runoff and conveying it to spreading areas for re-

charge of the groundwater basins. A quarter-of-a-million acre-feet were so conserved in the area in 1966. In its program for better management of the lower Colorado River, the U.S. Bureau of Reclamation is at great expense undertaking to reduce backwaters and river-bottom vegetation, in addition to improving facilities and methods of control, in order to reduce losses and wastes. This program is not without controversy, either. Strong conflicts of interest arise between those who would preserve the sloughs, side channels and wild growth for the sake of the hunting, fishing and recreation opportunities, and those whose primary interest is to save water. A fair and reasonable balance has to be struck, but that is far from easy, fraught with emotion and politics as well as engineering and economics.

Manipulation of watershed vegetation to increase water yield is past the research stage and being practiced in many areas, including the high country of northern Arizona. Other ideas are being explored to increase runoff, some rather far out, in my opinion, such as covering parts of watersheds with impervious blankets to reduce percolation into the soil. But they do indicate the universal desire to save and use as much as possible of the precipitation.

As to efficiency of use by the ultimate consumers, most all the public water supplies for domestic use are fully metered, and the costs are generally high enough to discourage extravagance. However, utilities can force absolute frugality upon the consumer only in times of imminent danger to water supplies.

Reclamation and reuse of sewage water for certain safe purposes are growing endeavors in the Southwest. Much remains to be done in this field, but there are economic limits as well as difficult problems of engineering and esthetics. Sewage water renovation is important as part of the water budget only on the seacoast, where sewage may be discharged to the ocean; 30 mgd (million gallons per day) are now being reclaimed in Southern California, and reclamation of some 200 mgd more is planned. Farther inland, the used water stays within the hydrologic basins and is purified artificially or naturally and reused probably several times. Southwestern farmers, already among the world's most efficient, are continually encouraged and are striving to adopt irrigation practices that will improve their efficiency of water application and use. They have to, where water is scarce and expensive. Irrigation canals, laterals and farm ditches are being lined with concrete, asphalt or other materials at a rate of many miles a year, particularly in the lower Colorado River service areas. However, much of the present seepage from conveyance systems is not permanently lost. It gets back into the supply either on the surface or underground, and can be reused, so the overall water saving from ditch lining is not as great as it may seem. Pump-back and reuse of irrigation tailwater is common practice.

Another idea sometimes expressed, apparently with the thought that it would increase the overall regional efficiency of water use, is to so manipulate the water price structure as to convert to a so-called "higher" use of

water; supposedly from agricultural to urban or industrial. Presumably this process would increase population density, in contrast to the suggestion of sending the people elsewhere.

The water price structure is too manifold and complex for effective manipulation to the end implied. Thousands of irrigation districts are involved, having vested water rights and owning their water facilities, and with varied means of supplying and pricing water. Many thousands of companies and individuals including farmers pump their own supplies from underground. The means do not exist to price these people out of business. Naturally where land use changes from agricultural to urban, as it is doing at a rate of about 25,000 acres [a figure closer to 40,000 acres has been published by *Geographical Review*—Ed.] a year on the coastal plain of Southern California and somewhat less rapidly in other southwestern metropolitan areas, the type of water use changes too, but water price manipulation will neither hasten nor retard the process significantly. This trend from agricultural to urban land use is taken into account in Southwest projections and water studies, and the internal water budget of the region still shows a deficit. Incidentally, the change-over does not necessarily reduce the water requirements per acre of land. In other areas of the region, irrigation farming and livestock raising will continue to be leading segments of the economy and must be kept healthy for the sake of the essential products they supply the nation. No one wants to or can deliberately force these activities out of existence by manipulating water prices. If they diminish in volume they will do so as a result of normal, not artificial economic pressure.

Other ideas are to increase the total water supply in the region, by tapping the clouds to increase precipitation, or tapping the Pacific Ocean to convert salt water to fresh. Cloud seeding at considerable expense is being practiced in numerous places in the Southwest, with results, if any, hard to prove and so far relatively insignificant in the overall water budget. Weather modification is in its infancy; its effectiveness or lack of it in providing more water won't be proven conclusively for years, despite the rosy optimism of some high government officials. Hair-raising legal, political and diplomatic problems have already arisen even in the experimental phases of rain-making and threaten to hamper further progress in this field. Competent scientists say we don't yet know enough about simple weather processes to afford much large-scale tampering. The Southwest simply cannot afford to wait for a happy day which may never come.

Desalination of ocean water, although it may help some day if costs are reduced, and can't be ruled out, is unlikely to provide the complete answer. Economic, social, physical and political problems are enormous. The proposed 150 mgd plant off the coast of Orange County, California, will supply the present peak demand of the Metropolitan Water District service area for little more than an hour a day. To supply the 13 million more people forecasted to be in the south coastal area before the end of the century would require at least 20 such plants, costing

perhaps \$8 billion, exclusive of the cost of additional storage and distribution facilities. Unit cost of the water, even at the optimistically low estimates projected, would be prohibitive for agriculture and probably too high for most any use far inland. Although salt water conversion may furnish supplemental and emergency supplies near the coast, it seems obvious that it can not serve the overall water needs of the Southwest.

No possibility such as increased conservation, salvage and reuse of water, rainmaking or desalting can be ruled out, and should be fully considered in the overall approach to solution of the Southwest water problem. However, it is extremely unlikely that any or all of them can provide the total answer. Even the most optimistic estimates of what can be accomplished by such measures fail by a wide margin to swing the answer to the region's water equation from negative to positive.

Consequently, and as a matter of course, those officials and agencies legally responsible for supplying water to the people of the region turn to the prospect of inter-basin cooperation, including importation of supplemental water to the Colorado, as the only real hope of a timely and enduring solution. Inter-basin transfer of water from areas of surplus to areas of deficit is by no means new. For half-a-century Colorado River Basin states have been conditioned to such transfers, and several large regional projects are built, being built or being planned in the Southwest to take water to where people want to live. The California State Water Project is a prime example. When finished in four or five years it will carry about 2.5 million gallons of water a minute into the arid south half of the state from the north half. Even so, it will not reach the vital agricultural areas in the southeast corner, will not directly help the other states of the Colorado River Basin, and will not even take care of the metropolitan coastal plain after about 1990. Long before that, additional plans must be laid.

California has enough water within its boundaries to take care of its own requirements into the foreseeable future, and could take the provincial attitude of ignoring the straits of its less fortunate neighbors. However, the state recognizes that in this age of economic interdependence and national unity the parochial approach is unwise and that the better and logical approach lies in regional water development to the mutual benefit of all concerned. In this connection California must decide soon which road it is to take, and once made, the decision will be irreversible. The state prefers the cooperative road.

For the Southwest as a whole, excluding northern California, the solution appears to lie in the importation of supplemental water from an outside source not only to augment the quantity of water in the Colorado but also to improve its quality. The growing water deficiency simply cannot be overcome by better conservation and use or by more studies and plans based solely on the presently available water resources. The search for additional water must begin immediately. Time is running out.

Because the search must extend far beyond the Southwest it cannot be insulated from the water problems of other regions of the West. It must be founded on a broad regional approach, transcending political boundaries, to integrate west-wide water resource development. Prerequisite are regional studies made cooperatively under common guidelines and coordinated under a centralized

control, to determine (a) where water surpluses exist (b) whether they can be taken without detriment, hopefully with benefit, to the areas of origin and (c) what means would be most feasible, most widely beneficial and most suitably integrated into a regional framework of development.

The most logical and practical source of surplus water cannot be conclusively determined on the basis of present data and knowledge. California's north coast for example produces considerably more water than it is expected ever to need, but to what extent the surplus can be captured and diverted elsewhere at feasible cost is problematical. The quantity that is feasible for export may all be needed ultimately in central and southern California. People of the north coast are becoming keenly aware however of the benefits they would derive, such as stepped-up flood control and added tourist attractions, as part of a larger regional plan of water resource development.

Similarly, the irrigation of many thousands of acres of land in eastern Oregon could be less costly as increments of a regional plan involving inter-basin water transfer than if it were undertaken separately.

It is only natural that water men of the Southwest should eye the Columbia covetously as they watch that river produce more than ten times the runoff of the Colorado, although the two drainage basins are about equal in size. Nevertheless few if any will express a professional opinion as to whether the Columbia discharges water that is really surplus to the needs of the Northwest, pending the results of further studies. Moreover, no plan of diverting water from the Columbia has been proposed or endorsed officially by southwestern states. Schemes that have been put forth by various parties are merely suggestions, and perhaps even pipe-dreams. None has been studied in depth, with sufficient expertise to judge its practicability. Such ideas, including also the export potential of California's north coast, should be examined in detail, to determine where and what real water surpluses there may be, whether inter-regional transfer is practical and if so what plan would be most feasible and most generally acceptable. Some such procedure is what the southwestern states have been trying to get started, on a cooperative, coordinated, west-wide basis. Until this is accomplished by competent authorities, answers to the many questions raised and problems involved cannot be assured.

But the need to get coordinated regional studies under way is urgent, because of decisions that have to be made soon, and because of the inevitable time-lag of 20 to 30 years between the beginning of reconnaissance and the completion of a regional project of the size needed, if one is found feasible. The Southeast cannot afford to mark time. 9

ARCHITECTURAL TREATMENT OF DAMS

Paul Thiry, F.A.I.A.

Dams, are among the greatest works of man. To promote the greatest benefits of dams and resulting reservoirs, stream control, and hydroelectric power, a presentation of the total possibilities inherent in such projects must be made understandable, not only to engineers and specialists, but also to the public which provides the money for their construction.

Public support and enthusiasm is all-important if we are to move forward in a positive way. To this end the people should not only understand the benefits of dams and reservoirs but should also be able to participate in their attractions. Only through an imaginative approach to the overall design of such projects is this possible.

Without undue elaboration and excessive cost, many features can be included in the design of a dam and powerhouse to make their appearance and function understandable and exciting.

Drama, scope, inspiration, and excitement are challenging ingredients and should be indigenous to a project. Environment, topography, streams, vistas, and settings can and should be adapted to useful and enjoyable pursuits. For example, stream banks and bends can be meccas for fishermen and sportsmen; lakes can provide areas for boating, swimming, skindiving, water-skiing, and general recreation; shores and hills can provide areas for camping, picnicking, hunting, hiking, and other outdoor activities; surrounding areas can provide sites for motels, hotels, and supporting supply outlets; piers, moorages, boat ramps, and view points can be built-in features.

The small amount of money needed—in relation to total cost—for these amenities would be well spent. Certainly, the expenditures would provide educational and recreational benefits of significance.

On viewing the TVA area, the Columbia River system, and the many projects visited in gathering information for this report, it was found that opportunities for public understanding and enjoyment of these works are far from always present.

Barricades, fencing, KEEP OUT signs, and employee parking in the most accessible spots discourage visitors. Awkward approaches, lack of attention, scarcity of things to do once you have arrived, inability to get around, inadequate shelter against sun and rain—all these contribute to creature discomfort and general resistance to full enjoyment and participation in the story to be told by the project.

In contrast to these annoyances, examples of many good features come to mind. There is the awesome loneliness of projects like Philpott and Apalachia. Norris, Hiwassee, and Fontana combine magnitude with much evidence of attention to small details. One remembers the recreational benefits of Chickamauga Dam with its Holiday Inn on the lake, and of Kentucky Dam with its swarm of fishermen in the turbulent waters below the spillways. There was the excitement of viewing the Dalles Dam at flood crest and of walking out to the edges of the platform to be drenched by the spray of the wildly cascading water.

On a view trip such as we took, one becomes aware of design, of textures, of gantries, of the various types of spillways, powerhouses, generators, penstocks, of stilling basins, and of the types and locations of switchyards. One notices such things as radiant heat generated by concrete, the heat and/or coldness of metal to the touch and the glare of aluminum railings and fencing in the sun. One wonders whether this dam can be driven across in a car or whether that one will provide parking.

It is natural to compare places where the various aspects of design are most pleasing, also to recall the beauty of certain lakes, of the wilderness scene, the vastness of nature of sky and trees—and to take exception to the appearance of man-constructed sheds, buildings, and docks which are incompatible, the highway through the defaced mountainside and along the riprapped river bank. One remembers construction which is meaningful and in keeping with its purpose and its surroundings—and that which is ordinary and unsympathetic. One wonders why the ordinary in most cases appears to be the most expensive to achieve and yet is the most destructive in its overall result. Engineering skill and beauty of design seem to be inseparable: where one excels the other follows. However, it seems that once the basic construction is accomplished, carelessness in detail also follows. These details include uses such as view points, roadside barricades, fencing, graphics as manifested in prohibitional and directional signs, in way-buildings, in the permissiveness regarding tourist facilities, camps, cabins, eating places, picnic grounds, and the great variety

of road devices, lighting standards, piers, moorings, boat ramps, and servicing structures, such as gas stations and wayside stores.

Disappointing tourist facilities, as at Allatoona, only serve to underscore the vast opportunities manifest in most projects. They contrast sharply with something like watching the boats at Old Hickory moving through the locks or the cars and trains as they pass over the Kentucky Dam.

With a composite of the many types of projects clearly in mind it was with pleasure we viewed the simplicity of Hungry Horse Dam, its general facilities, and how, for the most part, it is an unobtrusive part of the surrounding wilderness. Hungry Horse Dam made a fitting transition to the inspection of the site for the proposed Libby Dam on the Kootenai River in Montana.

Libby Dam site, with the exception of the railroad tracks on its east banks and the few scars made by cutting through some minor roads, is relatively untouched wilderness. The mountains rise on every side, cut deep by the Kootenai River which is joined downstream by the Fisher River. It is difficult not to be inspired by the beauty and serenity of the scene and the majesty of the setting—and not to feel a certain reluctance at the idea of disturbing it. The solitude, the mountains, the trees, the rocks, the river, the islands in the river, and the sky above with its scudding clouds are most impressive. The lake and the wilderness beyond the Hungry Horse Dam were similarly impressive.

The first thought, then, in visualizing Libby Dam was one of the blocked river, of the effect on this river and its islands, of the submersion of the mountains, and of what would appear above the newly-created lake. It was one of visualizing coves and peninsulas, wooded lake shores and the hills which would rise beyond them. It was an experience of walking down the Kootenai River and understanding what was destined for its banks, of the disappearance of its islands, of the narrowing and deepening of its channel and the effect on fish and wildlife, of the disfiguring possibilities of fills and riprapping, of seeing a change in the railroad and highway systems, of disruption and change generally. It was a matter of reviewing drawings of preliminary locations and relocations of the railroad and of the highways. It was anticipating an enlarged highway system and the intrusion of thousands of automobiles, of people who would stop to view the new dam, and of tourists who would look for facilities of all kinds—for camping, staying for a night, or fishing in a river which is to be dammed up. Actually then, the problem was and is one of making everything as compatible and homogeneous as possible and letting the wilderness live with the introduction of construction and an added form of wildlife known as Man. To this end, the following recommendations were made:

(Continued on overleaf)

1-3. *Fontana Dam, Little Tennessee R., North Carolina (TVA)*

4-5. *Norris Dam, Clinch R., Tennessee (TVA)*

6. *Chickamauga Dam, Tennessee R., Tennessee (TVA)*

7-8. *Hungry Horse Dam, S.F. Flathead R., Montana*

9. *Kentucky Dam, Tennessee R., Kentucky (TVA)*

10. *Hiwassee Dam, Hiwassee R., North Carolina (TVA)*

11. *Apalachia Dam, Hiwassee R., North Carolina (TVA)*

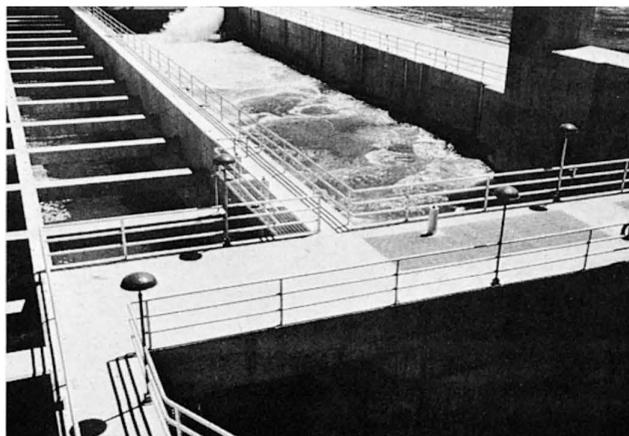
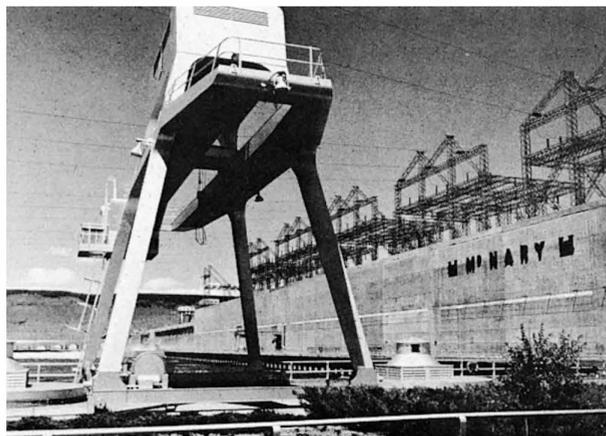
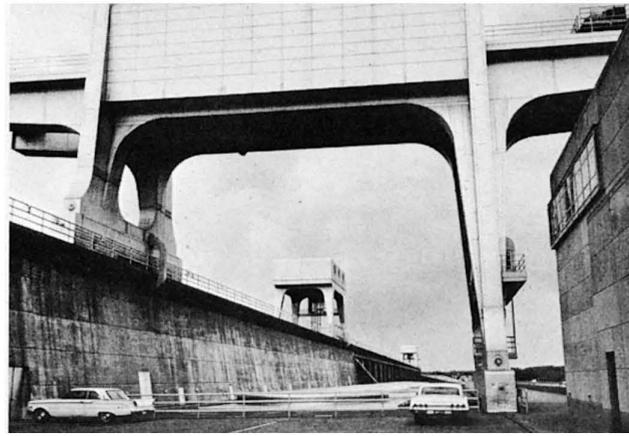
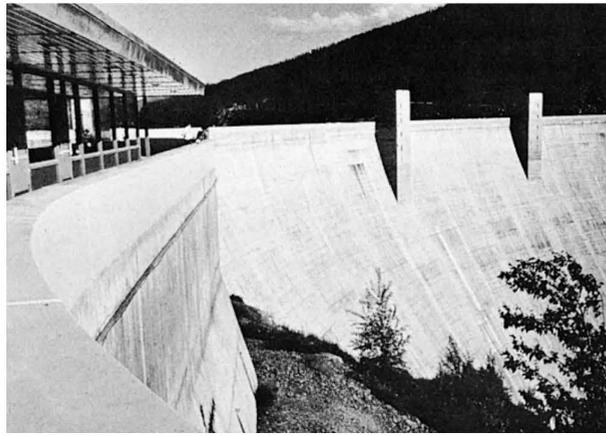
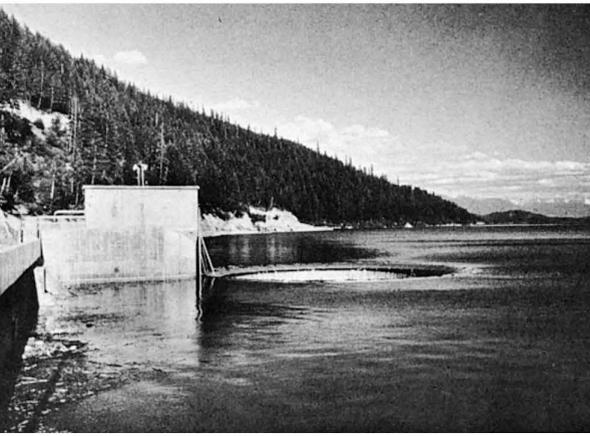
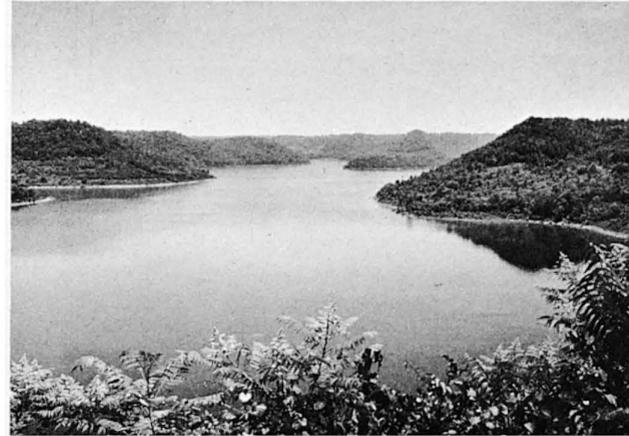
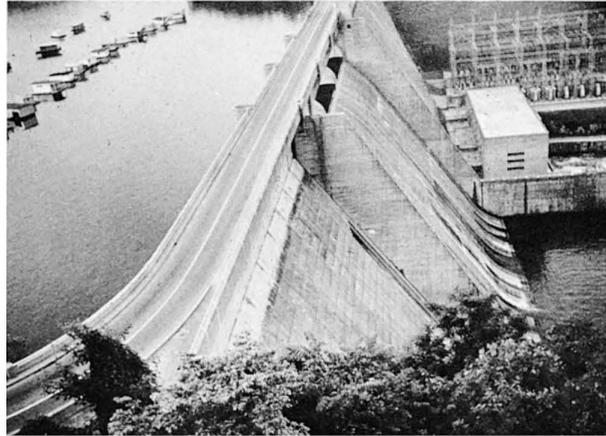
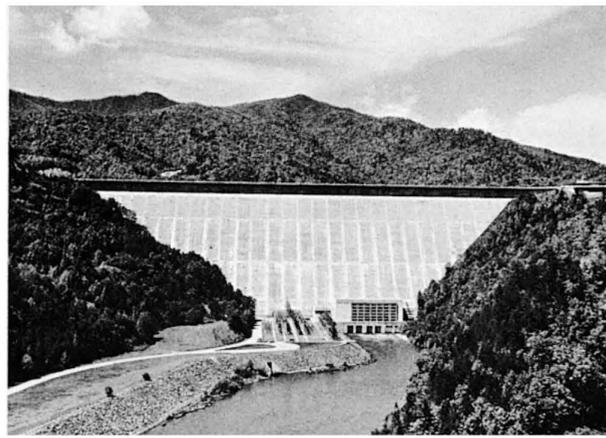
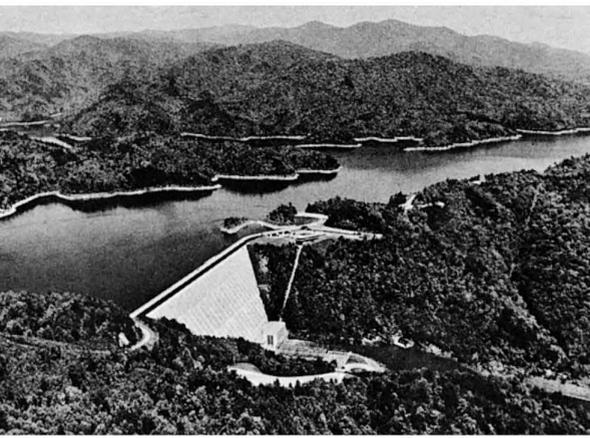
12. *Hungry Horse Dam overflow outlet, S.F. Flathead R., Montana*

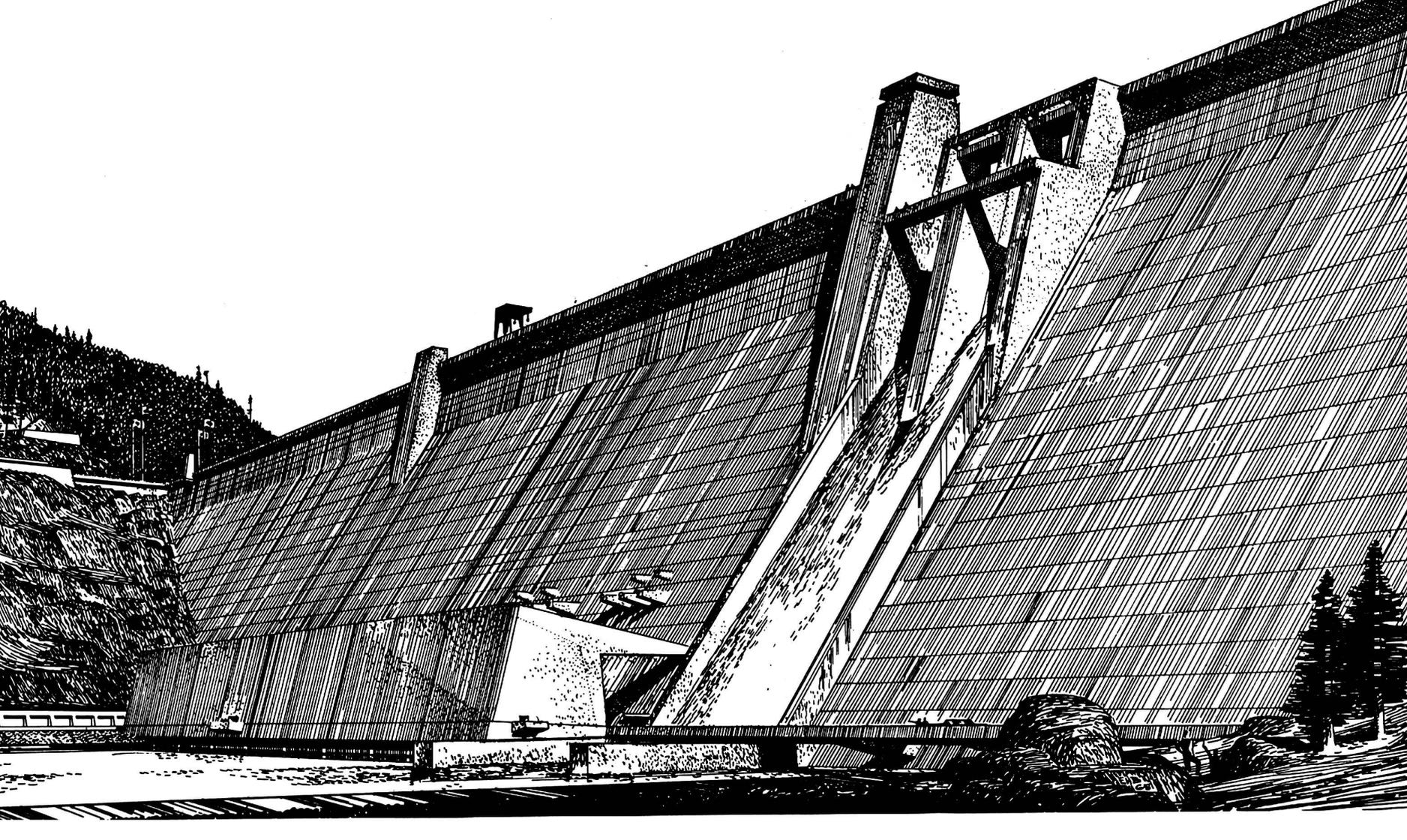
13. *The Dalles Dam, Columbia R., Oregon*

14. *McNary Dam, Columbia R., Oregon*

15. *Wanapum Dam fish ladder, Columbia R., Washington*

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LIBBY DAM

1. In the development of the Libby project it is mandatory that nature be disturbed as little as possible. Where the land is disturbed it should be replaced to simulate the natural as much as possible. Fills and excavations should be executed in such a manner as to be consistent with contiguous areas. Wooded areas where disturbed should be re-established. The channeling of the river should be done with as much sensitivity as it can. The retention of islands and wooded areas should be accomplished by routing the river channel to avoid their destruction. Where islands have been inundated or filled over, new islands should be created. Fills and riprapping should not appear to be manmade but should resemble existing nature to the greatest extent practicable.

2. Roadways, paths, and access routes should be detailed to follow natural contours in order to avoid scarring of mountain sides. Tunneling, in some instances, would add interest and save extended exposure of excavated areas.

3. In general, it would seem preferable to maintain existing rights-of-way on the west bank of the river for the improved forest road, and to maintain the alignment of the railroad on the east bank for an access road to the lower level of the dam and powerhouse.

4. The new Montana highway, proposed to parallel the river downstream of the dam, should be moved overland to provide better grades and to avoid cutting the entire mountainside along the river. This recommended location would have the added advantage of opening the upper areas to public use and providing a fine direct access view to the structure of the dam and powerhouse.

5. Encroachments on the shore areas of the new lake should be done with a minimum of defacement. Housing and camping sites should be located in such a way as to be screened by changes in contours. Piers, ramps, and moorages should be simply constructed and, where possible, of rock formed to match the natural stratification of the mountainside. Picnic area shelters, view points, parking area enclosures, and all structures not immediately associated with the dam, should be constructed to harmonize with nature. The use of native stone or of concrete forms is recommended. The design of all concessionaire buildings and facilities should be carefully controlled within strict design criteria.

12 6. The dam, powerhouse, points-of-observation shelters, information

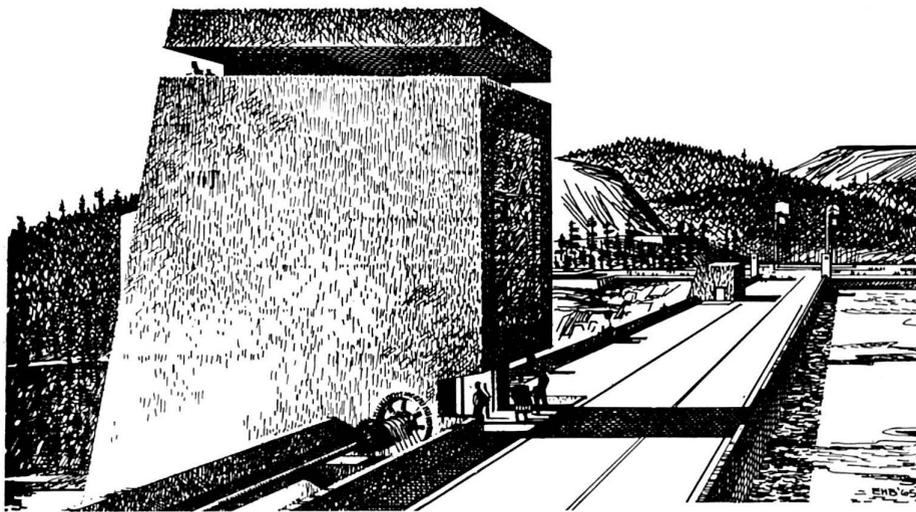
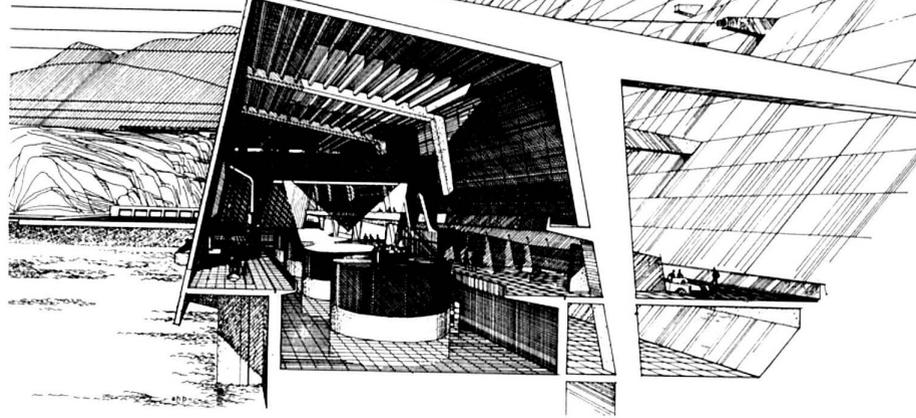
center, tourist facilities, and all adjoining buildings, walls, enclosures, parapets, copings, paving, and abutments should be of concrete and as simply contrived as possible. All forms and shapes should follow a fixed design pattern. The detail of curbs, railings, lighting standards should not be allowed to deviate. In a large project such as Libby Dam it is, paradoxically the minutiae which seem to set the line of demarcation; and any carelessness with minor detail detracts from the whole.

7. Our recommendation calls for a dam of more or less uniform width at the top to enable three lanes of traffic—two for moving vehicles, one for parallel parking. This type of traffic flow appears to be the best and does not call for any protuberances at the face of the dam which might detract from its simplicity.

8. Tourist facilities and view points are recommended on both the west and the east sides of the dam. The reception center, however, is recommended for the west side only. This location is off the main stream of transcontinental traffic and provides much better off-street parking facilities. Within the central information building should be included rest rooms, a small lecture hall, an observatory, and possibly a curio shop and countertype restaurant to serve light refreshments.

9. A view point is recommended above this facility high up on the hillside where a fine view may be had of the dam and powerhouse below. Similar view points are suggested in the hills on the east side as well as locations up and downstream for specific views in given directions. The principal view point, however, is in the middle of the dam from the "Treaty Tower," which is recommended as a symbol of the first United States dam built under the U.S.-Canadian Columbia River Treaty. It is suggested the tower house both elevator and stairways which will not only descend to the bottom of the dam but also rise to afford a commanding view of eight or nine miles of the lake and mountains as well as down the Kootenai River ravine.

10. The aforementioned tower is recommended to parallel the spillway. A room could be provided with an aquarium containing fish native to the region—there is also the possibility of opening a port onto the lake for viewing such fish as may be passing or be attracted by lights to the opening. Within this room could also be displayed artifacts or natural phenomena such as fossils, petrified rock, and Indian relics.



11. The powerhouse is to be reached by two elevators and connecting tunnels to the upper dam and by roadways which terminate in parking areas adjacent to the dam itself. A bridge across the lower reaches is recommended to make it possible to approach the powerhouse from either the west or east bank or to make a complete loop without retracing one's route. In case of emergency, this makes an ideal situation. Also, it makes it possible to drive up either bank of the river, make an entire loop by crossing the highway bridge downstream, returning by highway to the upper dam, and again to cross over from either side to the other.

12. The interior of the great concrete powerhouse should have considerable engineering and architectural impact and with the gantry, generators, and transformers create an unforgettable image.

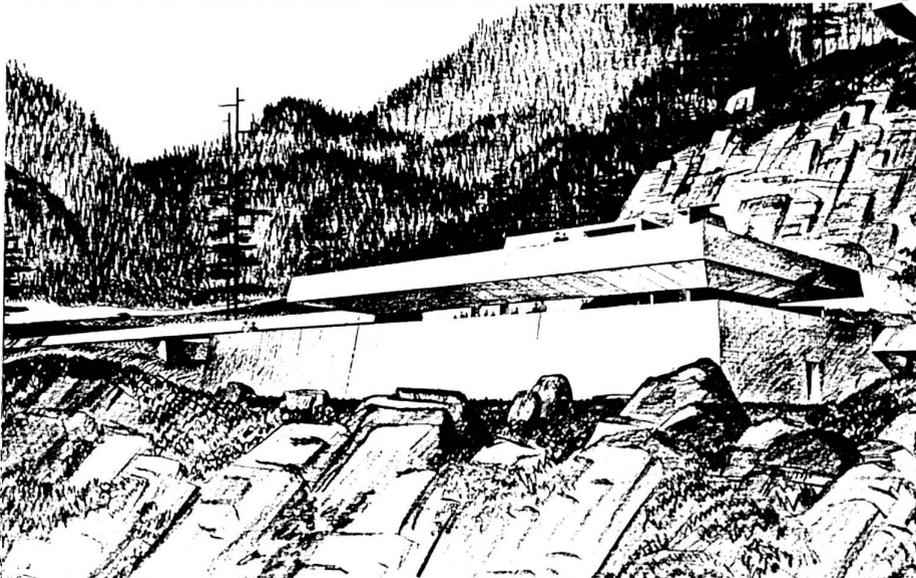
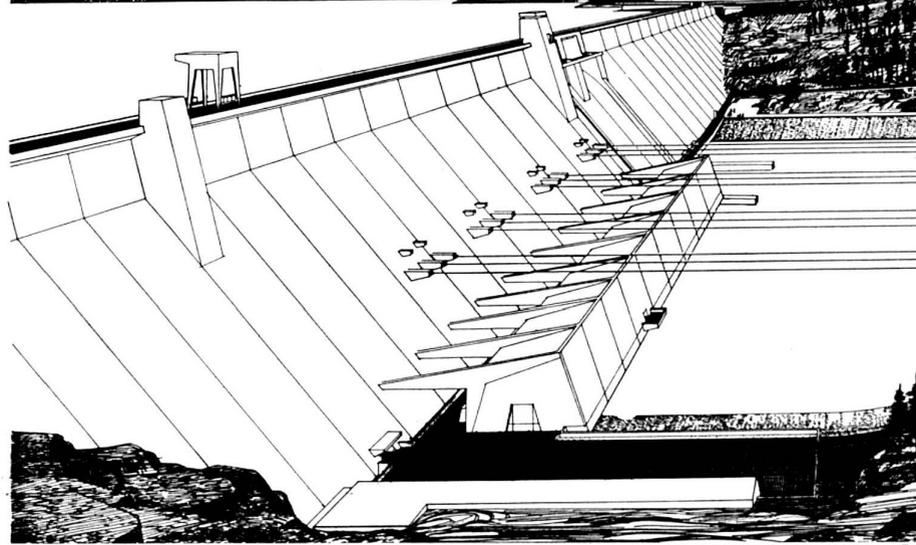
13. A large aquatic basin is recommended below the powerhouse and spillway to exploit the rush of water and dramatize its turbulence. When possible, sluices should be adjusted to assure agitation of surface water during visitor hours.

14. It is recommended the switchyard be on the east bank of the river because of the possibilities for making it a feature instead of the distracting element it is in most installations. The proposal calls for an earth embankment to minimize the unsightly appearance of the chain link fencing. The general appearance of the switchyard would be improved if the base structures were of concrete.

15. Camping, lodging, and concessionaire facilities are recommended for selected locations both above and below the dam.

16. Downstream at the intersection of Fisher River seems like an admirable place to locate a tourist village. This village should be served by bridges across both waterways, by the highways, and by the relocated railway. It could be served by bus and by train. It could have stations for both, as well as motels, shops, service facilities, outfitters for sportsmen, food supplies, and restaurants.

17. A similar village could be located on the lake, less the railroad. It is recommended that design of bridges across waterways be coordinated with the design of the dam as these structures tend to detract unless properly related.



WATER & POLITICS CALIFORNIA STYLE

Vincent Ostrom

The California water industry is the product of a century's effort by the people of California to solve their water problems. Its foundations were forged in frustration—frustrations derived from the uncertainties produced by contradictory decisions by different state authorities. Contradictory doctrines of water law had been allowed to stand; and the law of the highwayman became the effective law of water rights in California: "Take what you can get and defend what you have got."

The miners of the Sierras engaged in as contentious rivalry over water as they did for gold. Water was essential for separating the precious metal from worthless gravel amid the placers of the gold fields. The death of the California gold industry came in 1884 as the direct result of a federal court order enjoining miners from disposing of debris in any tributary of the Sacramento River system and from, thus, causing injury to downstream settlers.

The cattle kings built and maintained their empires by a vigilant defense of their claims to available water supplies. The Kern Land and Cattle Company and Miller and Lux, Inc., were among those who succeeded. Homesteaders struggled with cattle barons to secure enough water to irrigate their croplands. Some failed, but, in the long run, most succeeded. Many of the cattle barons eventually became land developers selling subdivided parcels with appertaining water rights to new settlers. In turn, the building of cities in this arid region was accompanied by a quest for the water coveted by the homesteader and the highlanders. Each saw his control over water as an essential ingredient in realizing his hopes and aspirations for the future.

Some of these conflicts provoked a release of energy which spent itself in exhaustion, without much to show for the effort. Some culminated in tragedy. Much more frequently the struggles were rewarded in some small measure by a resolution, a settlement or an agreement pointing the way to a new approach or to a new method for organizing human enterprise in the utilization and development of the water resources of an arid land.

Many of these innovations have been used in the development of water institutions in other states and in other countries. Most western states, for example, drew upon the principles developed in the rules of the California mining camps for formulating their basic law of water rights. Enterprises in many other areas have been modelled after California mutual water companies and the irrigation districts of California. Contemporary development in state water planning has drawn its inspiration more from the tra-

ditions of the State Water Plan in California than from the New Deal's efforts to develop state counterparts to its National Resources Planning Board.

The work of the Chaffey brothers in designing the institutional structures for the settlement of Upland and Ontario, California, was used to plan the colonization of the Murray River region of Australia. Elwood Mead, a professor of irrigation institutions at the University of California, was employed as a commissioner of water rights in Australia to help fashion their system of water law before returning to the United States to become the U.S. Commissioner of Reclamation. H. W. Grunsky, a colleague of Mead's in California, helped reformulate the basic water legislation for the Canadian province of British Columbia at the turn of the century. California innovations have, in short, been incorporated into the general pattern of water institutions in many different lands.

This process of institutional innovation is best observed in the general configuration of water institutions which form today's California water industry. It is a multi-billion dollar system of works and enterprises. The superstructure is composed predominantly of governmental agencies or public enterprises of one form or another. The substructure is composed of millions of water consumers of whom many tens of thousands function as independent water producers with their own systems of water supply. The growth and prosperity of the state as a whole is immediately dependent upon the performance of this strange admixture of public—federal, state, local—and private enterprises forming the California water industry.

Two large-scale producers, the U.S. Corps of Engineers and the U.S. Bureau of Reclamation, each operate water works which represent a cumulative capital investment in California of more than one billion dollars.

The California Department of Water Resources is becoming the third large-scale producer. Its Feather River works will store water for release into the Sacramento River system, and its California Aqueduct will divert water from the Sacramento River delta to Southern California with service to intermediate points. An investment of more than two billion dollars will be required before the state's water works system becomes operational in the 1970's.

The intermediate water service agencies are also gargantuan in proportions. The largest of these, the Metropolitan Water District of Southern California, is predominantly a water wholesaler serving the Southern California metropolitan region with a network of aqueducts, reservoirs and watermains extending to the Colorado River and girding the Southern California coastal plain. This system represents an investment in plant and equipment of more than a half billion dollars, and a 1.3 billion-dollar expansion program is planned.

The Los Angeles Department of Water and Power is the largest combined municipally-owned, water and power utility system in the United States. Its independent water supply system includes most of the water yield from Mono Basin, Owens Valley and the upper Los Angeles Basin with a network

of aqueducts, tunnels and diversion works that extend nearly 400 miles into Mono Basin on the eastern slope of the Sierra Nevadas. The San Francisco Municipal Water Department and the East Bay Municipal Utility District have comparable systems that take water from the western slope of the Sierra Nevadas to supply the metropolitan communities of the San Francisco Bay region.

Most urban communities in California are served by municipal water departments, public water districts or cooperatively-owned mutual water companies. Rural areas are usually served by irrigation districts, other public water districts, or mutual water companies. Private enterprise engaged in the water business as a profitable endeavor is the exception rather than the rule. Altogether there are nearly 1500 mutual water companies and perhaps an equal number of public water districts and municipal water supply systems. The cooperative mutual water companies tend to be small-scale operations by comparison to most public water district and municipal systems.

As the structure of the California water industry has developed it has tended to become more fragmented. Local water suppliers have become more specialized in distribution of water services to the ultimate consumer and in functions of retailing. The intermediate agencies have tended to become wholesalers, while the large-scale state and federal water resource management agencies have become more specialized in the operation of major production facilities and diversion works at the sources of water supply.

Horizontal segmentation in the organization of water institutions has occurred with the development of two or three distinct types of water systems — supply, storm drain and flood control, sanitation and water quality control—for every highly developed area of human habitation in California, each system managed by a separate and independent set of agencies.

Finally, another group of agencies manages certain in-the-channel or flow resources in California's rivers, reservoirs, lakes and ground water pools, e.g., the fish and wildlife agencies, the park and recreation agencies, harbor and navigation agencies as well as the large-scale water production agencies which use their facilities to supply water for in-the-channel uses as well as for diversion purposes.

Thus, the picture of the California water industry stands in sharp contrast to the American ideal represented by the Tennessee Valley Authority: a single regional authority responsible for the comprehensive planning and integrated management of a river basin on a multiple use basis. And yet, the California water industry has transformed an arid desert region into a land of unparalleled agricultural productivity and industrial growth. Perhaps this industry of assorted public and private enterprises provides us with a different model of organization for water resource development deserving of serious attention and study.

Amid the political and legal frustrations, contradictory decisions and doctrines, private property rights under California law of water rights did not perform their economic

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Author's note: "I am indebted to Resources for the Future, Inc., Washington, D.C. for support of much of my recent research on California water problems. However, I alone am responsible for any of the conclusions or opinions expressed in this article."

function of allocating a scarce resource to the highest bidder. Instead, water rights were used as a political means of giving each claimant a voice in the course of action to be taken in the solution of mutual water problems. Litigation over water rights has been a major preoccupation in California but in the course of time, the folk wisdom of the water industry came to reflect the futility of seeking court decisions as an effective means to exclude an adversary's claim. An expression of frustration, "Law suits never produced a drop of water," became the motto of the industry.

The preferred solution was to find a mutually agreeable arrangement for increasing the available water supply for all of the interests involved from some new supplementary source of supply. Along with an engineering plan to increase the available supply of water came the task of designing an appropriate structure for the organization of an enterprise to carry out the engineering solution and to continue to represent the community of water producers in the government of that enterprise. If demand exceeded the yield of a local water supply and if all water producers had equal access to that local supply, the development of a supplementary source of supply would be of mutual benefit only if all producers shared in the cost of acquiring the new supply. If one producer could hold out and satisfy his demands from local supplies while others met their increased demand from the new, more costly source of supply, the hold-out would then be able to gain the benefits without paying his share of the costs for expanding the available water supply. If one hold-out could free-load, so could others, and the viability of a physical solution to common water supply problems would dissolve in vindictive bickering and rivalry.

The solution to this type of problem in designing the structure of an enterprise to undertake the development of a supplementary water supply was facilitated by the use of the organizational form of a public as opposed to private instrumentality. A public enterprise can be organized to include a whole community of people who will benefit from a common undertaking without having to gain the voluntary subscription or willing consent of each and every potential beneficiary. The public enterprise formula solves the problem of the hold-out. A public enterprise also has the power of taxation, and the costs of securing a joint water supply can in part be recovered by levying taxes as well as by charging a price for water services. Finally, the organization of the internal political structure of a public enterprise provides an opportunity to represent those it serves by giving them a continuing voice in the government of its affairs.

Each new physical solution to a water problem in California is accompanied by the negotiation of a new political solution among water users. The primary burden for fashioning both the physical solution and the political solution is usually assumed by entrepreneurs representing the community of people who will become the principal beneficiaries. Solutions are fashioned in numerous rounds of discussion and of negotiation at the conference table. A settlement is

reached when an effective bargain is struck. Litigation is used only when the processes of accommodation and negotiation breaks down. Similarly, decisions by legislative bodies or decisions by the electorate are sought only when a proposed solution requires formal validation by political authorities. Within the water industry it is universally assumed that substantial consensus among water users is the essential condition for assuring the political feasibility of any new undertaking. In the absence of consensus among a community of water users the judgment is frequently expressed that, "We are not ready to go to Sacramento yet."

At any particular level of development those responsible for organizing and conducting the enterprise and for implementing the engineering solution will seek to exploit the opportunities which they have created both by expanding the domain of their enterprise and by seeking new sources of water supply when justified by growing demand. This imperialist stage of growth and expansion proceeds until checkmated by competitive rivals. The checkmating is accomplished when a rival or a coalition of rivals is able to nail down a veto position through governmental action, either through court action, legislative action, popular referenda or a combination of these methods.*

The stalemate is then resolved by seeking a new solution within the context of a still broader community of political interests. The political task is one of converting frustrated rivalries into a cooperative game against nature. The new solution must include both the engineering of a new scheme for a new source of water supply as well as the political negotiation of a new pattern of organization to govern the new enterprise.

This process can again be illustrated by the development of a new source of water supply for Southern California from the Colorado River. When the city of Los Angeles began to explore the importation of a new supply of water from the Colorado River, the venture had been conceived as a municipal undertaking. In order to establish the political feasibility of the new undertaking and secure appropriate authorizations both in the California legislature and in Congress, a new political solution had to be devised to solve the water problems of its erstwhile rivals as well as those of the city of Los Angeles. The organization of the Metropolitan Water District of Southern California represents the political solution which was negotiated by representatives of these diverse Southern California communities to undertake the importation of Colorado River water to the Southern California coastal plain.

With the consolidation and expansion of Metropolitan, checkmating strategies occurred on two different fronts. One involved Arizona's efforts to checkmate California interests; the other involved Northern California efforts to checkmate Southern California. Both efforts to establish veto points and develop bargaining positions based upon

*The operation of these political dynamics can be observed in the search for solutions to water problems among the communities of Southern California. Los Angeles was able to embark upon its stage of imperialistic growth and expansion by the acquisition of its greatly increased water supply from Owens Valley. This was followed by a great wave of annexa-

those veto points were successful; and the conditions for negotiating a new pattern of political settlements were established.

An accommodation between Northern and Southern California interests was attained not by Metropolitan going it alone to develop a new source of supply on the Russian or the Eel River as Metropolitan had proposed, but through a state program to develop the Feather River and build an aqueduct to Southern California both to serve Metropolitan and to supply other service areas along the aqueduct route. The political settlement also involved a commitment to sustain a program of water resource development in the mountain counties of Northern California at the sources of supply.

When the solutions become state-wide or inter-state in character, the political aspect of the solution takes on a different structure. The political settlement is no longer incorporated into the charter of a self-governing public water district such as the Metropolitan Water District Act. Instead the settlement is represented by a whole series of inter-agency agreements formulated in contractual undertakings and in legislative authorizations. The general political community of interest is no longer represented in a governing board like Metropolitan's board of directors but is organized in the context of various water users' associations and inter-agency committees representing the several agencies and communities of interest involved in the common undertakings. The Pacific Southwest Inter-Agency Committee is an illustration of such a group concerned with inter-state aspects of water resource development in the Pacific Southwest. The California water industry is still governed primarily by negotiations with recourse to appropriate governmental authorities when negotiations break down. General reliance upon governmental authorities for reaching decisions in the absence of negotiated settlements is so very costly that most decisions are reached by some form of negotiated settlement. Governmental authorities are relied upon primarily to establish veto points, to determine bargaining positions, and to validate negotiated settlements.

A political settlement of the water demands of the budding political community in the tri-state area of the Pacific Southwest is still in the making. California has now embraced Arizona within a common community of interest in an effort to establish the feasibility of a new Southwest water plan. The ultimate shape of the engineering solution and of the political solution remains to be determined. On the basis of prior experience we might expect a new league of the Southwest to scan the distant horizons for a new source of water supply. Where will they go? Who will become the new rivals? When will the processes of consolidation and expansion be checkmated? How will the new political settlements shape the constitutions of new communities of political interest as the California water industry comes to find its niche

tions which expanded the city's boundaries to their present proportions. This wave of expansion was first checkmated by the refusal of people in surrounding communities to approve referenda to consolidate with Los Angeles during its annexation campaigns, and by an intense political storm provoked by Owens Valley interests opposed to the city's water program.

among Western water institutions?

Has public entrepreneurship in the California water industry produced the right results in the development of the state's water resources? The methods of public entrepreneurship have been most productive in yielding a generous supply of water to meet the demands of an extraordinary pattern of growth in an arid region. The California water industry has earned a badge of special merit for its dynamic performance. An ample supply of water has been available to meet most requirements for growth and development.

However, a number of economists have recently questioned some of the industry's methods. Rapid expansion may lead to over-production; and over-production may lead to a wasteful or uneconomic use of scarce resources. If this is the case, what are the elements in the California practice of public entrepreneurship that lead to this result? What do these conclusions imply for the future of water and politics — California style?

With the very high rate of economic growth and development which has occurred in California during the past several decades, public bodies responsible for supplying water to meet these demands have had every incentive to attempt to pre-empt as much water as they reasonably justify. The reasonableness of their justification has often depended as much upon the veto position of a potential rival as upon appropriate standards of economic justification. Frequently an agency joining in a new development will hedge against the future and attempt to assure its own independence of action by holding some potential source of water supply in an undisclosed reserve. The availability of such undisclosed reserves has either meant that the reserve supply was not being put to economic use; or if brought into production concurrently with a new source of supply, the development of the undisclosed reserve would then tend to lower demand and weaken the viability of the new undertaking.

The Department of Water and Power in the city of Los Angeles has had recourse to such a strategy on two separate occasions. The first instance occurred when the city proceeded independently in tapping the water supply of Mono Basin *after* commitments had already been made to develop the Colorado River supply. As a result the city of Los Angeles has had only a nominal need for Colorado River water once it developed the Mono supply as a least-cost alternative.

This process is being repeated following the authorization of the \$1,750,000,000 bond issue by the people of the state to construct the California Aqueduct and transport northern water to Southern California. The Los Angeles Department of Water and Power is currently adding a second barrel to its Los Angeles Owens River Aqueduct and thus expanding the yield from that source of supply.

An additional undisclosed reserve of potential water supply also exists in the water discharged through the sewerage systems of Southern California. The feasibility of reclaiming much of this water at less cost than Feather River water has been demonstrated in pilot-plant programs on a number of oc-

casions. This potential source of supply is still largely being held as an unpublicized reserve to hedge against the future.

The incentives for over-development or over-production of water supply in the California water industry have been greatly accentuated in the past 30 or 40 years with the substantial expansion of activity by the large federal water production agencies. The make-work policies of the Depression years led to a substantial expansion of federal expenditures on water works projects. While the W.P.A. and the P.W.A. have long since passed from the American scene, the federal water production agencies, both the Corps of Engineers and the Bureau of Reclamation, are still using programs born in the Depression years to sustain a flow of subsidies for the support of water resource development projects. When this factor is added to the dynamic style of public entrepreneurship in the California water industry, the momentum of development is greatly accelerated.

Are there any dangers in this acceleration of development or do these strategies represent an appropriate hedge against the future by assuring an ample stock of water for whatever course of events the future may hold? An aggressive course of development is faced with three major types of risks in attempting to pre-empt the future.

First, the probability of error is increased the further developments are projected into the future. Plans for the year 2020 can be made with little confidence.

Second, as the costs of water production rise in relation to each unit of output, a point will eventually be reached where the cost of transferring water over great distances will exceed the costs of producing water by different methods from alternative sources. E.g., eventually the declining cost-curve for desalinization of ocean water will intersect the rising cost-curve for transporting water from great distances.* Prospects of increasing water production by weather modification may provide still another alternative source of supply.

Third, over-development of vendable water supplies can lead to an imbalance among all of the various uses for water resources. A balanced program of water resource development needs to take account of all of the joint and alternative uses for water—consumptive, recreational, industrial, agricultural, etc.

Rather minor changes would go a long way to establish a better balance in the equilibrium of the California water industry and still preserve the energy and vitality of this complex public enterprise system.

First, every effort should be made to maintain the economic principle that the beneficiaries should bear the costs for the goods produced by an enterprise. The result is usually assured in the private sector by the sale of a product

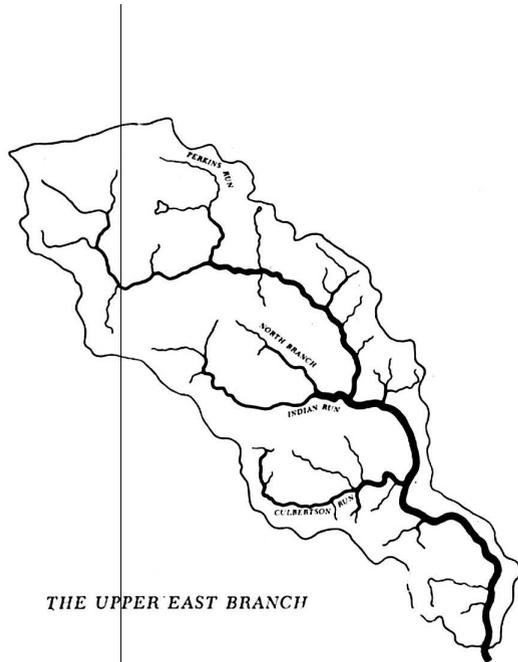
*When the desalinization programs were first undertaken some 15 years ago the price target was to produce desalted water for \$1 per 1,000 gallons (\$326 per acre-foot). Costs have now declined until 30 cents per 1,000 gallons (\$97 per acre-foot) is a reasonable estimate of the current cost of desalted water at sea level. The cost of Northern California to convert water by comparison, will be something in excess of 20 cents per 1,000 gallons (\$65 per acre-foot) when delivered to Southern California. Transferring Columbia River water to the Pacific Southwest would almost certainly exceed the future costs of desalting ocean water to supply the coastal communities of California.

for a price. The same principle can be applied to enterprises in the public sector whether the costs are borne by taxes, service charges or a combination of both. Subsidizing cheap water for agriculture does not lead to the economic use of water in a state that is being overwhelmed by urbanization.

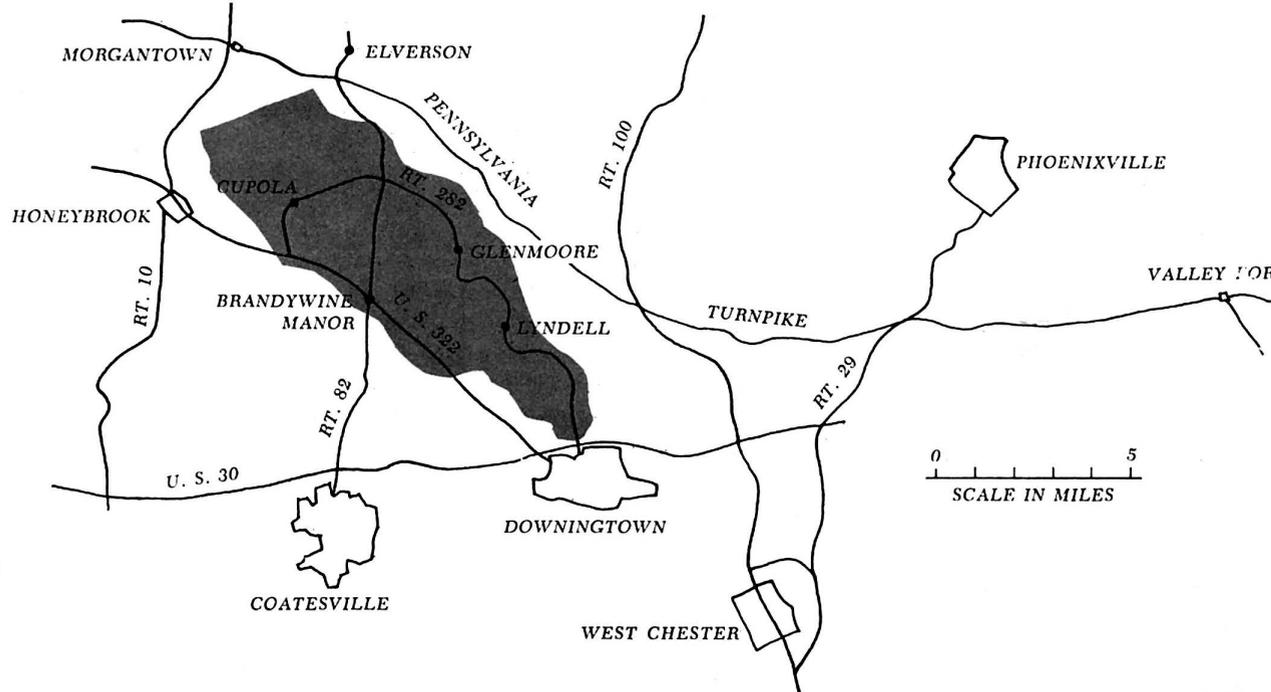
Second, more careful economic calculations will occur when the price of water is directly proportioned to the use of water services. Water priced to reflect the quantity used leads to more economic use than water priced by flat rates or paid by tax levies. Conversely, if the quantity and quality of waste water could be metered and priced proportionate to the costs imposed upon the operation of the discharge system, an incentive would be created to reduce waste discharges and to increase the recirculation of water when feasible. Similarly, if fishing license fees were established to reflect the value that fishermen place upon sport fishing there would be less tendency to underestimate the importance of recreation in the development of water resources. As opportunities for leisure grow the modern city dweller may want to measure the relative value of water in other forms than tapwater.

Third, the policy of permitting the free appropriation of "unappropriated" water should be discontinued in the same way that the free homesteading of public land was discontinued several decades ago. Public waters like public lands have a value that should be taken into account in resource management programs. In recognition of the economic value of water at its source, new appropriations should require that an appropriator pay an annual rent or production charge for on-land-use equal to the value of that water for in-the-channel users. Such a policy would create less incentive for water developers to follow strategies of attempting to pre-empt as much water as possible and to hoard undisclosed reserves for development in the more distant future.

Finally, the diverse agencies operating in each of the more highly-developed, water marketing regions with access to two or more independent sources of water supply should be encouraged to follow the example of some Southern California communities overlying ground water basins in that region. Water agencies in those areas have taken concerted action to institute coordinated programs for ground water basin management by such measures as 1) adjudicating ground water rights 2) reclaiming waste water 3) replenishing ground water supplies 4) charging a pump tax on ground water production to pay for the replenishment programs and 5) developing water exchange agreements to facilitate the buying and selling of water rights among local ground water producers. These measures create opportunities for more efficient management of ground water supplies and for the development of market forces in the reallocation of ground water among different producers. As long as one or more independent sources of supply is available to meet long-term demands, local ground water producers should be free to rent or sell their pumping rights to the highest bidder. Ground water supplies would then be made available for their highest economic use, rather than being used as the cheapest source of supply. When Alexis de Tocqueville visited the



THE UPPER EAST BRANCH



PRIVATE LANDS AND PUBLIC BENEFITS

By John C. Keene and Ann Louise Strong, University of Pennsylvania Institute for Environmental Studies, and Robert E. Coughlin and Benjamin H. Stevens, Regional Science Research Institute

[The purpose of this research project in the Brandywine Valley near Philadelphia is to determine the feasibility of imposing new land use controls for protecting water resources and open spaces in order to achieve a beneficial relationship between urban settlement and the natural environment. The local Water Resources Authority proposes to pay property owners for the right to limit development in areas critical to the protection of the ecology. If the program is successful, not only will it conserve the Upper East Branch basin of the Brandywine Creek but also will demonstrate how to protect similar stream and river valleys throughout the United States.]

Most human institutions, both public and private, are organized for the purpose of increasing or protecting the welfare of their constituents. The adaptation and exploitation of nature is instrumental in attaining this purpose. Historically, with few exceptions, man's needs have been achieved with only moderate damage to the natural environment.

In the last century-and-a-half, however, technological changes and urban growth have greatly increased man's impact on the natural environment. Wastes from industrial processes have contaminated land, air and streams. A heavily urbanized and growing population, by converting vast areas of countryside around our metropolitan centers to urban uses, has added to pollution loads, lowered ground water levels, increased the frequency of flooding and the dollar losses due to flooding, and has robbed the environment of its natural amenity. This process has accelerated rapidly during the past generation.

The recent upsurge in environmental exploitation can be thought of as one of the major factors in the high economic standard of living enjoyed in most developed countries. The exploitation of natural resources such as land and water and the resulting congestion and pollution have tended to raise the economic costs of utilizing these same resources. Even more significant are the non-economic costs suffered by society because of the losses to the natural environment itself. The disappearance of pleasant stream valleys surrounded by pastured or wooded slopes, along with the disappearance of accompanying wildlife, is a psychic and social cost to the people of an urban area which cannot be assumed to be insignificant simply because it is difficult to measure.

In recent years, more and more people have become convinced of the necessity to take action to protect the nation's water resources and to preserve open land in the country's metropolitan areas. These natural resources are important not only for water supply and recreation, but also for their vital role in preventing a destructive disruption of the balance of nature. In addition, if stream valleys, slopes and wooded areas are left in their natural condition, they provide variety and

The experiment is under the leadership of the Chester County Water Resources Authority. The primary research group consists of the Institute for Environmental Studies of the University of Pennsylvania in association with the Regional Science Research Institute and the U.S. Geological Survey. Also participating as consultants are the U.S. Soil Conservation Service and the Academy of Natural Sciences.

beauty for the people who live and work nearby—qualities which are noticeably lacking in many of the typical suburban communities around our cities.

If we rely on present public policies and programs, the quality of water resources will continue to decline and much of the open space near the cities will be developed, helter skelter. The rapid increase in population, family formation, income and social mobility, will accelerate the rate at which farmland and natural areas are converted into homesites and shopping centers over the next generation, dwarfing by the year 2000 the tremendous suburban growth which the country has experienced since 1950.

For years there have been only two accepted means of public action to preserve land in a natural condition: regulation or acquisition in fee. These two governmental powers, located at the opposite ends of the land use control spectrum, leave a large gap in the range of public choice. Regulation by zoning cannot constitutionally prevent development of land in growing metropolitan areas. Furthermore, highly restrictive, low density zoning often collapses as development pressure builds up. Full public ownership, on the other hand, is not necessary



where land is to be preserved in a natural condition to protect flood plains, to prevent erosion or to keep scenic landscape as long as no active public use of the land is contemplated.

For purposes such as these, a variety of new legal mechanisms has been developed for preserving land in an undeveloped condition while allowing the continuation of private occupancy. Through these mechanisms private land-owners are compensated for public restrictions put on the development of land. Most of these mechanisms leave land in private hands and on the tax rolls, and maintain it without public expense. Federal and state laws have been passed which authorize use of most of these mechanisms. However, agencies concerned with preserving water resources and open space have used them little or not at all. The lawyer's stress on precedent combined with the public official's preference for the safe and known have not produced a climate conducive to experimentation. It is essential to overcome this reluctance and to bring the full range of land development controls into widespread use. A critical step is to experiment with the legal mechanisms and to give broad circulation to an evaluation of their strengths and shortcomings.

This project is such an experiment, proposing a demonstration of the effects of public imposition of newly developed mechanisms for control of land development and use on a significant part of a medium-sized watershed in a growing metropolitan area.

It seeks through related research to determine whether application of such mechanisms to large tracts of presently undeveloped land in a metropolitan area will have significant hydrological and ecological effects, will yield social and economic benefits which will more than cover the short-run costs of such a program, and will leave a legacy of increasing value to the urban society. If this can be demonstrated for a single experimental basin in the Philadelphia metropolitan area, it is hoped that similar efforts, publicly financed, will be encouraged in the several states and metropolitan regions of the United States.

Specifically, the objectives of the demonstration and related research are:

1. to guide development away from critical portions of a watershed and to observe the effects of such a development pattern upon the water resource system and ecology of the watershed;
2. to observe the effects of the program upon urban development patterns in the remainder of the watershed and, in a more gross way, throughout surrounding areas;
3. to observe the effects of the water resource protection and open space preservation upon the "quality of living" of residents within and near the stream basin;
4. to evaluate the benefits from the observed effects, including the effect upon land values within and nearby the regulated area, and to compare them with costs;
5. to observe and evaluate shifts in attitudes and actions of civic and governmental groups as they cooperate to create a good physical environment;
6. to evaluate each legal mechanism as to benefits, costs, efficacy and acceptability to landowners and administering agencies.

The demonstration is to be conducted within a stream basin, a physiographic unit which appears to form a cohesive natural system. Specifically, a 37 square mile stream-basin—the Upper East Branch of Brandywine Creek—has been chosen. The basin, which lies 35 miles from the center of Philadelphia, now is sparsely settled but is expected to be subjected to strong pressures for urban development during the next decade or two.

A program is being prepared in consultation with the eight townships in the basin which will delineate the critical areas to be protected from development and will indicate recommended regulations for minimizing erosion during development, handling storm runoff and treating sewage in the remainder of the basin.

Several statistical control areas outside the basin have been chosen so that the effects within the demonstration basin can be compared with effects which occur under normal urbanization.

The Chester County Water Resources Authority would be responsible for the actual negotiations and transactions with landowners, for the compiling of data relating to those transactions, and for the enforcement of the controls imposed. The Authority would hold all rights in land acquired.

Support of and cooperation with local governmental bodies and citizen groups are vital to carrying out the demonstration and are important measures of its success. Two committees have been set up: a governmental Coordinating Committee, made up of township supervisors and township planning commission members, and a Citizens Committee, made up of representatives of community organizations.

Some of the effects of the demonstration would not be realized for a long time. Therefore, the demonstration and accompanying research are to be divided into two phases. The first phase should run for six years as follows: first year, imposition of controls; second year through fifth years, observation of operation of controls and their effects; sixth year, preparation of a comprehensive report, including operation of controls, their effects and evaluation of effect. The second phase of the research, which would be more limited in scope, would provide an opportunity to continue observations of the experimental and comparison areas in order to determine longer run effects. It is suggested that the second phase might run an additional five years.

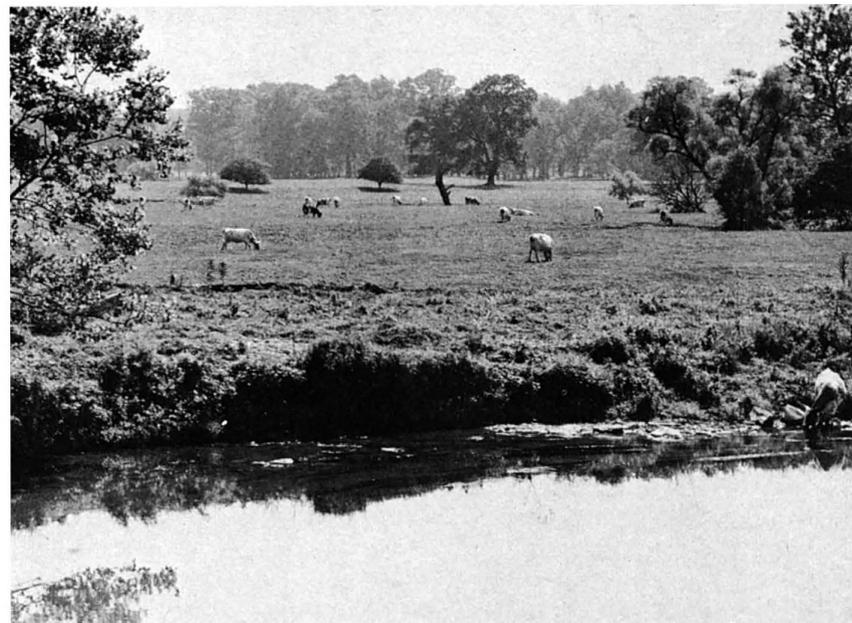
Land Use Control Mechanisms

The demonstration program will delineate land areas of various types which have a critical importance to the water regimen of the Upper East Branch of Brandywine Creek and will prescribe a selection of

land use controls designed to preserve these areas in low density use. Five land use control mechanisms have been chosen:

1. *Acquisition and resale with use restrictions.* Acquisition and resale consists, first, of fee acquisition by a public agency of land planned for continued low density use. Following acquisition, the acquiring agency imposes covenants to assure continued low density and resells the land to a private buyer.

2. *Acquisition and lease with use restriction.* The land is leased rather than sold after imposition of covenants restricting the land to low



density use. This mechanism is especially suitable if the public agency has long-range plans for eventual active public use of the land, as for a reservoir or wildlife sanctuary. It can hold the fee; secure interim private low density use; gain limited revenues through lease of the land; and, at the end of the lease period, assume full public control and use.

3. *Conservation easements or water protection rights.* Conservation easements or water resource protection rights are defined as rights which the Authority has to secure continued low density use of private land. The rights might be affirmative, such as a flooding easement, or negative, such as a scenic easement. A deed, stating the rights being acquired by a public body, is paid for when acquired at a price established by negotiation or through eminent domain proceedings. The fee interest remains in private hands, subject to assessment for taxes on the basis of the value remaining after acquisition of the easement.¹ Land subject to conservation easements or water resource protection rights can be bought and sold freely.

4. *Compensable regulations.* These are regulations, in the nature of zoning, which restrict land to low density uses and guarantee payment to the landowner for the impact the restrictions have on market value. They differ from conservation easements of water resource protection rights in that payment is not made at the time of imposition of the regulations. Instead, it is made whenever afterwards the land is sold. The amount of the payment is the drop in the market value of the property, if any, between the time of enactment of the compensable regulations and the time of public sale. The market value immediately prior to and unaffected by the regulations is established by a special appraisal made when the regulations are enacted. The amount of the initial guarantee, reduced by any payment to the first seller, remains in force to be drawn upon by subsequent sellers of the property if the use regulations cause a further decline in value. Land subject to compensable regulations remains in private ownership, continuing on the tax rolls with no public maintenance costs.²

5. *Installment purchase with concurrent use restrictions.* The public body would pay for the land in installments over a number of years, and title to a portion of the property would pass to it with payment of each installment. During that time the seller could continue to occupy the land, but would be restricted to low density uses. This mechanism might be found particularly appropriate by a public body which desires to acquire an open space site subject to development pressure, but which has insufficient funds for immediate fee purchase. Under any of the five mechanisms, there would generally be restrictions limiting tree cutting, grading, filling, dumping, billboards and

other activities inimical to sound water resource management and destructive of natural beauty.

In addition, development regulations will be drafted dealing with erosion, with disposal of storm water and sanitary wastes, and with other impacts of urbanization on the stream system.

The Institute for Environmental Studies is responsible for the detailed design of procedure and controls.

The Regional Science Research Institute is responsible for incorporating the water resource proposals into a program for guiding growth in the basin.

The United States Geological Survey, in conjunction with both Institutes, is responsible for determining those areas most critical to the protection of water resources and for specifying the range of uses in these areas and in the remainder of the basin which are compatible with sound water resource management.

The program is, of course, subject to recommendations of the local and county governments and must be approved by the Chester County Water Resources Authority and the County Commissioners.

Choice of Area for the Demonstration

The following factors were considered in choosing the project watershed:

1. *Sensitivity of the hydrologic system to change resulting from urbanization.* Flow duration curves and water quality data were studied in order to select a basin still in sound hydrological condition and a basin whose hydrologic characteristics are typical of the piedmont.

2. *Natural beauty of the area.*

3. *Range of urbanization potential.* In order to test the controls adequately, it is important that they be tried out in a number of market situations.

4. *Support by governmental bodies and citizen groups.* It is axiomatic that a public program can be successful only if government officials favor its goals and if it can look to a supporting constituency. In all of the watersheds under consideration, we found a high degree of enthusiasm for a program such as that proposed.

The Upper East Branch of Brandywine Creek was chosen because it best met all of these criteria. The stream is healthy, though there is some enrichment from grazing animals and septic tanks. The land is well nurtured, thanks largely to the long-term efforts of the Brandywine Valley Association to promote sound conservation practices. The countryside is beautiful; small forests, neat farms, and scattered homes cover the rolling hills and valleys. A nearby intersection of the Pennsylvania Turnpike, a new state park, and general metropolitan expansion all point to rapid urbanization in the future. Land values for open land ranged, in 1960 from \$50 to \$4,000 per acre, thus providing a wide range of values against which to test the land use controls. Enthusiasm for the proposed demonstration program has been voiced by public officials and civic leaders at both the county and township levels.

Hydrologic considerations, primarily, and land values, secondarily, determined the exact definition of the project area. In order to maintain control over the hydrologic system, it is important to begin at the head of the watershed and work downstream, thus including the entire basin from the headwaters to the cut-off point. There are 1,300 parcels of land within the 37-square-mile project area, providing enough transactions so that the cost and price results for each form of legal control will be statistically significant.

Effects on Metropolitan Land Use Patterns

Our present pattern of urbanization has been widely criticized as being wasteful of land and other resources. Low densities, requiring the construction of unnecessarily long road and utility lines and causing excessive operating costs for the provision of the basic urban services, create an endless, uniform semi-urban landscape, which leaves its inhabitants without a sense of community and without a desire to become involved in community affairs. The preservation of land in a natural state with very low density uses, by definition, removes land from possible development, channels new urban development elsewhere, and tends to raise effective densities on remaining developable land.

It is quite likely that development nearby the demonstration area would take place at higher than normal densities because the land preservation diverts development elsewhere and also because the preserved land provides an attractive country setting for adjoining residential development.

Insofar as the demonstration area is a large-scale low density system, it will have a significant effect in shaping urban development in one sector of the metropolitan area. There, instead of the usual sprawl of suburbia, one might expect to find a large scale system of open valleys bordered by relatively concentrated communities, each of which would be bounded on two or even three sides by the open space. The existence of clear and permanent physical boundaries should heighten the sense of place of the communities, which should lead to an increased pride of place and a high level of involvement in civic affairs.

Evaluation of Effects

The effects of protecting water resources by development controls and by covering land areas which are critical to the water regimen with a pattern of quite restrictive but compensated, land use controls are of interest in themselves. However, the justification for carrying out a public program of water resources protection must rest not upon the effects themselves but upon the values society places upon the effects of that program.

The social desirability of any new and untried program cannot be assumed. Nor will the new program be evaluated directly by the public as a new commercial product would be. Therefore, a major objective of the project research is to determine whether the public and private costs required to achieve water resource protection goals through preservation of critical areas in low density uses are outweighed by the resulting public and private benefits.

Most of the benefits will not be created directly in a positive sense by the project. Rather, they are benefits whose loss will be avoided through the land and water managements effects of the project. Therefore, the extent of this loss avoidance must be measured, in part through the evaluation of losses which occur in the comparison areas, where comprehensive land and water management will not be in effect.

Water resource benefits are traditional ones—avoidance of flooding, avoidance of pollution, avoidance of costs of dredging silt, and of excessive storage and purification of water. Also, there should be benefits resulting from savings due to the concentration of public services and tax increases due to land value rises without corresponding service cost rises. These types of benefits, which may be called “fiscal benefits,” are normally registered through public and private institutions and are measured in monetary terms.

Other benefits are less tangible and methods for their evaluation less well developed—benefits resulting from the preservation of natural amenities, the maintenance of ecologic balance, the assurance of an alternative residential environment to the dominant uniform suburban development. These benefits are called “environmental benefits” since they consist of utilities received by individuals through the personal enjoyment of effects of environmental preservation. The proposed research will focus on the evaluation of both sets of benefits.

By autumn of 1967, the people of the Upper East Branch basin will have decided, through their Boards of Supervisors and County Commissioners, whether the demonstration program should be carried out. If their decision is favorable, it will then be necessary for the Chester County Water Resources Authority to obtain the funds needed to compensate landowners for the restrictions to be placed on their land.



NEW WATER

Michael H. Salzman

The Nobel Foundation has scrutinized the historical course of the majority of great discoveries. It was found that knowledge is carried to a stage where the discovery comes, more or less by itself, to a scientist with an open mind. That is, a scientist who has intuitively separated out from the trivial observations the little something which, on closer analysis, leads to the discovery. It is only this scientist who finds what has escaped many scientists who, in their hands and before their eyes, had the same possibilities of making the discovery.

Despite all of our advances we still do not know enough about water. The following account illustrates how stubborn adherence to traditional lines of thought can blind us to new ideas and possibilities.

I had been tracking down the occurrence of water flowing in the fissures of solid rock for almost four years when a perfect illustration came along. Out of a single hole in the solid rock, a contractor, excavating for a new addition to Harlem Hospital on New York's upper east side, was pumping more than three million gallons of water each and every day from only twelve feet below the first floor level of the existing hospital.

Both the contractor and the city each hired consultants to find the origin of such tremendous quantities of water coming out of a single hole in solid rock. At first, the consultants' logic said: "This water must be leakage from the City water supply." But chemical analysis showed the water to be different in its composition than that of the City water supply for the area. Then logic insisted: "Obviously, this water must be leakage from the sewerage system." But when Uranine, a green dye, was put into all the adjacent sewers and none of it came up the water hole, they began looking elsewhere. In final desperation, their logic then dictated: "Of course, the close-by Harlem River must be the origin of these waters. There can be no other explanation than seepage from the Harlem River." No sooner was it offered when this last hope of explanation had to be discarded. Hospital officials had completed their examination of the water and verified that it was pure and fit for human consumption. Without chlorination or any other treatment, how could the horribly polluted Harlem River be its source?

Here was the mystery. Where was the water coming from, and why was it warm? When first encountered, the water's temperature was 64 degrees Fahrenheit but it slowly began to rise until, after a number of weeks, it was up to 68 degrees. *Despite the attendant publicity, including a careful exposition in Engineering News-Record, no one attempted any further explanation.*

After carefully checking the facts and the geology of the area, I submitted a brief article of explanation several months later. The

Mr. Salzman is author of *New Water for a Thirsty World*, with a foreword by Aldous Huxley (Science Foundation Press, Los Angeles 90053, 1960), and currently principal city planner, City Planning Department, Los Angeles. The views expressed in this paper are those of the author alone and should not be construed to be those of the City Planning Department, the City Planning Commission, or the City of Los Angeles.

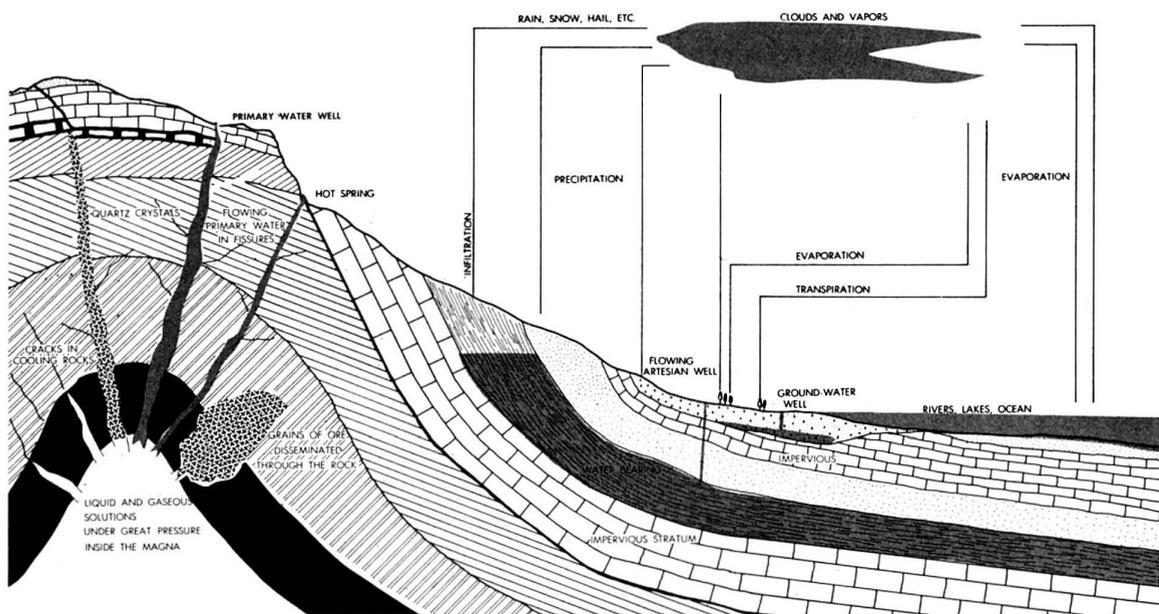
editor soon replied that my discussion presented an interesting and little-discussed theory on the replenishment of water supplies. When my article was published it was accompanied by an editorial preface—one of surprise that despite the efforts of many agencies the source of the flow had apparently never been determined, and more surprising that there had been no comment, other than my own, on possible reasons for the flow and its origin.

Again, despite the Editor's challenge, no geologist or hydrologist attempted to explain why the water had remained at 68 degrees Fahrenheit for 13 months, winter or summer, and why the flow had remained constant until they sealed the hole.

If we are to understand water, we must first

erly interpreted by saying that all natural waters, the waters of the hydrologic cycle, are formed by the mineral H_2O , which has its origin deep within the earth as do the other minerals of economic value.

When William W. Rubey was president of the Geological Society of America and also chairman of the National Research Council, he addressed the National Academy of Sciences regarding the geologic evidence of the source of the earth's hydrosphere and atmosphere. His conclusions were that both the ocean waters and the earth's atmosphere have come from the interior of the earth and, according to Rubey's calculations, in the years of the earth's existence hot springs alone have yielded over 100 times as much water as exists in the present oceans.



rid ourselves of such common beliefs as: "Water is matter. There is as much now as there ever was—no more, no less." Perhaps it is true for our ever expanding universe, but the supply in and on the earth is not a fixed and immutable quantity. The supply is decreased by dissociation; by hydration; by life itself—and increased by association; by dehydration of rocks, and by death.

Everyone recognizes that all life is dynamic, that it is in a state of constant change, but far too many people believe that matter is static. Matter, however, is never inert, never indifferent to its environment or to changes in its environment. Even the diamond, which is the hardest and most firmly fixed of crystals known to man, yields to the agitation of very high temperature and burns to a gas in oxygen. Other minerals, formed under great pressure in the depths of the earth, break down when brought to the surface. But the fact is that they are adjusting themselves to their new environment of relatively slight pressure and lower temperature.

Natural waters in their various states, liquid, gas, or solid, are actually rocks. This is prop-

What, then, has happened to all of this water? Why hasn't the entire earth been completely flooded?

The answer is that water is destroyed by photochemical dissociation. Water has an essential part in photosynthesis, the process by which the sun's energy is harnessed first for the life of plants and then for all animal life. Photosynthesis destroys water at a rate in excess of 390 billion gallons each day.* At this rate, all the waters in the oceans would have been depleted in about two-and-one-third million years. Considering the earth's age at four-and-one-half billion years, the earth would have run out of water a long time ago if new water were not being produced continually in its interior and added to surface supplies.

*Plant life, of both sea and land, fixes about 146 billion tons of carbon annually. This carbon is produced from about 535 billion tons of carbon dioxide annually. Since the ratio of oxygen liberated to the carbon dioxide reduced approximates unity, then approximately 535 billion tons of O_2 are liberated annually from water. However, since two molecules of water are required to form one O_2 molecule, then 535 billion tons of O_2 liberated annually from water represents the destruction of about 600 billion tons of water each year.

In addition to photochemical dissociation of water by plant life, photochemical dissociation of water vapor takes place in the upper atmosphere. High in the troposphere, above about 70 km., especially over the equatorial belt, water vapor is bombarded by cosmic rays and dissociated into hydrogen and oxygen. The hydrogen, being lighter, escapes up to the higher strata of the atmosphere and may even dissipate into the void. The existence of the hydrogen envelope encompassing the earth was recently verified by missiles sent aloft from White Sands, New Mexico.

Estimates of the amount of water vapor dissociated in the upper atmosphere is translated into the destruction of almost 2.5 million tons of water annually. Throughout the 4.5 billion years of the earth's existence more than 11×10^{15} (11,000,000,000,000,000) tons of water would have been so dissociated.

There are many other means whereby water is withheld temporarily from available supplies. If there were no additions to the terrestrial water supply, the fixation of water by weathering would ultimately exhaust the earth's water supply. Water chemically combined with cement, sand and gravel to make concrete; the increase in the total world population (body water comprises about sixty per cent of total body weight) as well as animal population, each temporarily but increasingly removes water from the available supplies.

In almost all modern handbooks of mineralogy, the crystalline structure is the basis of the classification of minerals. Crystalline rocks contain water in varying amounts. It has been estimated that there are about $22,000 \times 10^{15}$ tons of crystalline rocks in the earth's crust and that the total amount of water contained therein is probably 1,800 to $2,700 \times 10^{15}$ tons, which is in excess of the $1,405 \times 10^{15}$ tons of water estimated to be in the earth's hydrosphere (for practical purposes the ocean masses). And the earth's crust is a relatively thin shell of the earth.

As far back as the 16th century, Georgius Agricola, considered to be the father of modern mineralogy, discussed two kinds of ground water. The first being the surface waters which have percolated into the earth, and the second the waters which originate in deep seated sources within the earth itself.

In 1902, Edward Suess described how the students of ore deposits came from various vague theories to a clear understanding of the important functions of circulating ground water and magmatic separation, which involves the segregation of water from the magma, and that this water is closely related to the genesis of metalliferous deposits.

In the United States alone there are thousands of springs that each yield at least 650,000 gallons per day and hundreds that each yield more than 6.5 million gallons per day. But those that are classified as first magnitude springs are the 65 that each yield an average of more than 65 million gallons per day.

It is interesting to note that of these first magnitude springs, 37 rise in volcanic rock, one in gravel underlain with volcanic rock; whereas 24 are in limestone and 3 in sandstone. The first magnitude springs which

rise in the volcanics are closely associated with faults, fluctuate less frequently and to a far lesser degree than those in limestone, and are remarkably low in dissolved mineral matter.

Springs may be divided into (1) springs due to gravitative pressure transmitted through a continuous body of ground water, and (2) springs of deep origin flowing as the result of the expulsion of water during the crystallization of igneous rocks. The best general evidence of the existence of new water, however, is furnished by the study of old intrusive regions where the granites merge into dikes, then into quartz, and then into veins carrying quartz and metallic ores. Here is evidence difficult to controvert, that dikes consolidated from magmas gradually turn into deposits, the structure and minerals of which testify to purely aqueous deposition. This admitted, it is difficult to see what would prevent such waters from reaching the surface.

Stephan Riess, a Californian who came out of mining engineering, has been successfully locating water wells by drilling through solid rock to intercept a fissure containing fresh, flowing water. Riess had once been a mining engineer and his interest in water stemmed from the fact that many of the mines on which he had been employed had been flooded out by water. These experiences coupled with an early recognition of water shortage problems spurred him to the development of a scientific method of locating these solid rock fissure waters from the surface of the earth. As a result of visits with Riess, I resolved to search and research for information that would either dispute or support his theories which differed from the conventional ones with which I was familiar. It seemed a good idea to start where he did—in mining. I learned that Adolf E. Nordenskiöld, a professor of mineralogy at Stockholm, successfully drilled many solid rock fissure wells and was nominated for the first Nobel Prize in Physics for his accomplishments. Nordenskiöld died in August, 1901, before the Swedish Academy of Sciences had convened on the question of prizes so that his candidacy never really materialized. Study of Nordenskiöld's work shows that two men, widely separated in both time and place, could predictively locate fresh, flowing water in the fissures of solid rock.

Josiah Spurr, the most eminent mining geologist of America, in summing up his many years of experience with mine waters, made three important observations:

1. Openings in rocks exist at all depths, especially along faults or fracture zones;
2. Waters found in these openings circulate vigorously, and,
3. These waters range in temperature from cold through lukewarm and on rare occasions to hot.

In mineral regions where extensive post-mineral fracturing due to faulting has occurred, water in the fracture zones frequently introduces difficult problems. The world renowned Comstock Lode, an area of silver mines at Virginia City, Nevada, provided the most profitable production of silver in the United States until they were flooded by waters at a depth of 3,000 feet.

The mine at Eureka, Nevada, was flooded out prior to 1950 but pumping 7,500 gallons of water per minute enables them to continue mining operations—a flow of 10,800,000 gallons per day in an arid-basin region can't be explained by precipitation!

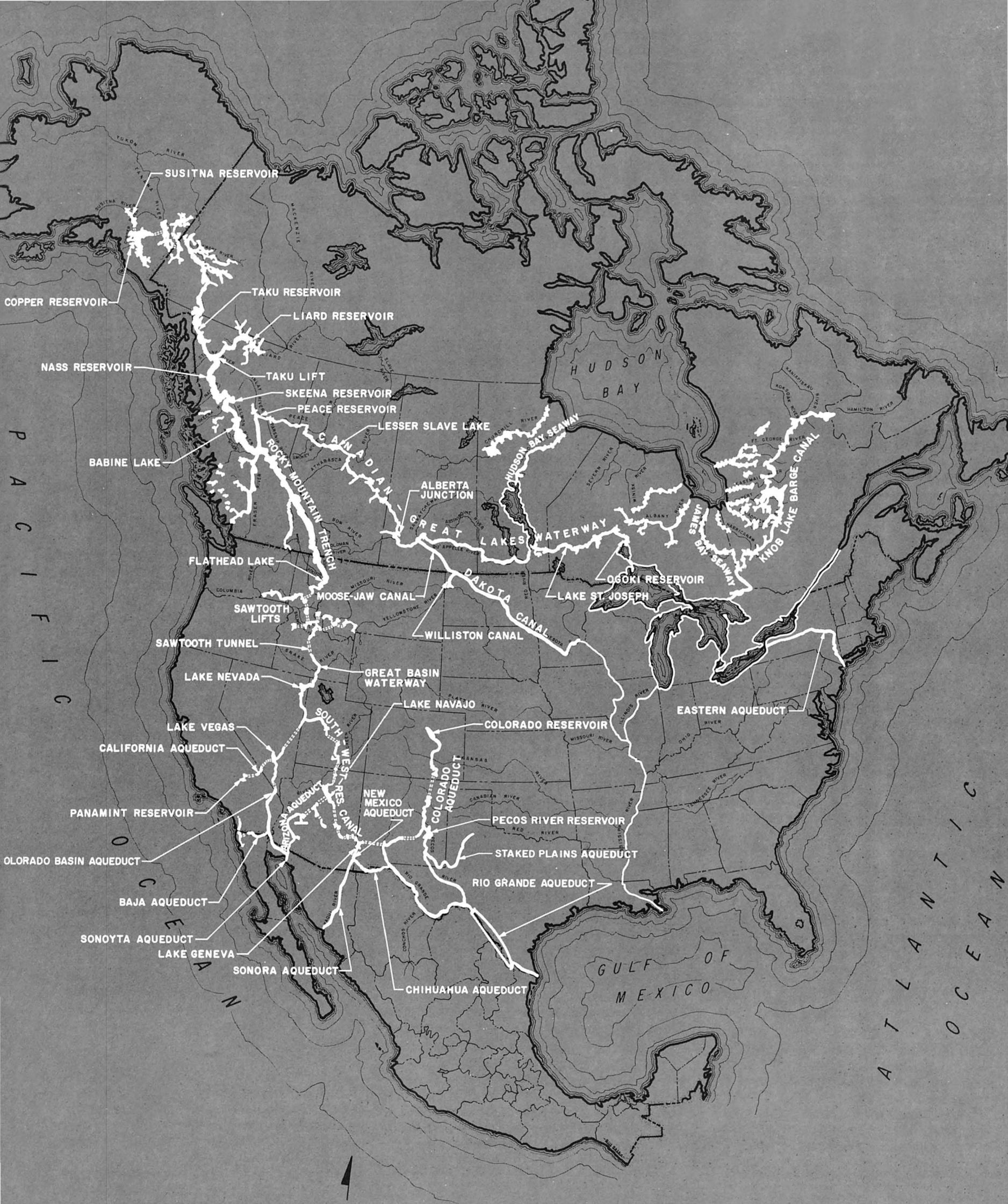
Similarly, mine after mine could be cited, but one most interesting case occurred during the unusually dry summer of 1959. That year saw water rationing at the U.S. Hahn Air Force Base in the Moselle River area of Germany. Our Army Engineers, called in to find water, found an old mine some 9,000 feet from the base with its galleries filled with about 2.5 million gallons of water only 67 feet below ground. The emergency project was to draw the water from the mine and pump it to the base. But no one seemed to consider how all this water managed to get into the mine during such an unusually dry summer.

Obviously, not all fractures or fissures contain water, and those that do may carry hot and highly mineralized water of various concentrations, or on the other hand, cool, fresh, potable water. Inasmuch as the solubility of most minerals is greater at increased temperatures, there is frequently a relationship between the temperature of the water and the amount of its mineral content. However, if the waters pass through a rock structure containing minerals which react chemically with those in solution in the water, the minerals from the water may be deposited in the rock structure. Such rock structures are termed by mining geologists as "host rocks." If the rock structure is cooler than the water circulating through it, the rock absorbs some of the water's heat until equilibrium is reached. This explains the aqueous deposition of minerals and metals of economic value, the slow increase in the temperature and the later temperature stability of water from solid rock fissures, and the fact that such waters can be pure, fresh, and fit for man.

The hydrologist's knowledge of ground water occurrence is essentially about that found in unconsolidated rocks (the sands and gravels). Cyrus Tolman, who has written extensively on ground water, says that the study of water bodies in fractured but consolidated rocks has been neglected.

Furthermore, while head of the Ground Water Division of the United States Geological Survey, Oscar Meinzer wrote: "Perhaps the most important function of faults in relation to ground water is that of conduits leading from deep sources of water up to the surface. Openings of no other kind probably extend so far below the surface, and no other structural features are so effective in allowing the ascent of deep-seated waters."

A hypothesis becomes verified, even if not proved beyond every doubt, through the successful predictions it makes. The successful predictive occurrences in the careers of Stephen Riess and Adolf Nordenskiöld cannot be ignored; nor can an open mind reject the evidence of the tremendous potential supply of water of internal origin lying available and untapped. In a country that wastes and wants, traditional views and thinking cannot be permitted to block this possible solution to our water shortage problems.

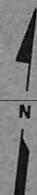


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any suggestion of sharing water rights but even a reluctance to sell them for profit. The Northwest will sell hydroelectric power (from federally financed dams) but not water and the Southwest must depend on the inadequate 15 million acre-feet of the Colorado River while an estimated 180 million acre-feet flows out to sea annually from the mouth of the Columbia. Governor Hatfield of Oregon said only last month that a water surplus in the Northwest was a "surface illusion." The state legislature has, however, appropriated a million dollars for a water inventory.

Canadian reaction to the NAWAPA plan varies within the expected norm. In British Columbia—source of most of NAWAPA's water—there is adamant opposition—official and unofficial. W.A.C. Bennett, premier of British Columbia, has stated, "We'll sell the U.S. hydroelectric power but not water." Sen. Moss, in a recent speech, quoted a Canadian detractor: "The North American Water and Power Alliance is not an alliance, it has no power, it has no water, and it is not North American. It was thought up in Southern California and it is just a scheme to enrich a Los Angeles engineering firm." Other Canadian opponents take the less pregnable position that the U.S. has wasted, polluted and muddied its own waters and now is proposing to help itself to theirs.

There has long been unrest at the extent of U.S. investment in—i.e. control of—Canadian manufacturing, mining and other economic activities; the government, while admitting to the possibility of an exportable surplus, at first officially rejected NAWAPA, maintaining that there is no way of accurately determining what that surplus might be today let alone in the future. Furthermore, even if the surplus were determinable, Ottawa said, those surplus waters might very well be the decisive consideration in attracting the industry and population needed to open up the north and northwest. Since then, presumably attracted by the prospects of \$2 billion a year, an inland waterway from the Atlantic to the Pacific, and stabilization of the Great Lakes, the government's position has softened. In any case, whether for NAWAPA purposes or in furtherance of its own water development program, Canada has initiated an \$80-90 million study of its resources and projected needs.

Still, advocates of NAWAPA estimate that it will take ten years of negotiation to complete the necessary treaties (estimated construction time is 20 years and Canada believes it will take a generation to determine how much surplus water will exist in light of future needs).

In the interim much must be done to eliminate our lack of internal agreement on how to connect up the several parts of our own distribution system in preparation for any NAWAPA—type program.

"We do not have a very strong posture from which to bargain for imports," Sen. Moss said. "The first thing we must do to assure a continuing return from the \$100 billion investment required for NAWAPA is to make a detailed water inventory and to make sure we are taking care of those water production areas. We must be sure we do indeed have a continuous supply of surplus water to distribute. The second thing we have to do is clean up the water courses we want to use in that distribution system . . . Third, we must take a hard look at how we use water to make sure we get the most mileage per gallon . . . Finally, we have to provide for the collection, storage, transfer and distribution of water."

At this conceptual stage in its development, NAWAPA's significance lies in its scope. It has opened up the whole question of water resources at such a scale that hopefully never again will water planning be done within the traditional limits of artificial political subdivisions and geographical sub-basins. As Sen. Moss said, "The very magnitude and daring of the NAWAPA concept have made us raise our sights about water resource planning. It undoubtedly shaped President Johnson's recommendations for a National Water Study Commission to develop overall national water policy." It also doubtless was in the minds of the Congress when it passed the 1966 Clean Waters Restoration Act, requiring individual states to draft their own water quality standards which would then be federally enforced. (Deadline for submitting standards was June 30. By July 19, all but Alaska, Oklahoma and the territory of Guam had done so, though only a handful have been found acceptable by Washington.)

By raising our sights and offering us a vision of total water management encompassing a continent, NAWAPA forces us to see the problem whole. While primarily concerned with collection, storage, transfer and distribution, the proposal cannot be implemented—nor would it be effective—without parallel programs of conservation, pollution control, efficient usage and discipline.

Though technologically able, we are not yet socially or politically capable of solving the water problem and, in Sen. Moss' words, "NAWAPA is more important right now as a symbol. It embraces the things we need to do to preserve and extend our water resources."

D.T.

Summary of Federal and NAWAPA water resources plans and developments.

River basin	Federal agencies pertinent data						NAWAPA pertinent data					
	Number of reservoir projects	Storage	Installed capacity	Number of irrigation systems	Number of navigation projects	Estimated cost	Number of reservoir projects	Storage	Installed capacity	Number of irrigation systems	Number of navigation systems	Estimated cost
		Acre-feet	Thousand kilowatts					Acre-feet	Thousand kilowatts			
Alaska	89	1,973,807,500	32,311.5			\$7,543,470,000	3	1,486,400,000	1,119	10		\$1,996,000,00
Arkansas-White-Red	279	98,611,338	4,166.3	12	13	5,934,584,162						
Central and South Pacific and Central Valley	270	95,260,823	9,870.3	8	6	7,922,779,380						
Colorado	228	81,995,905	111,686.7	60		4,766,487,338	26	20,772,000	11,623	16		8,235,880,000
Columbia	246	108,600,656	35,415.8	129	4	10,289,641,860	18	29,330,000	27,100	8		17,088,000,000
Great Basin	67	5,353,580	188.7	11		425,812,958	1	7,312,000		15		11,346,000,000
Great Lakes-St. Lawrence	161	6,918,965	4,064.2		9	2,561,540,267						
Hawaii	3	(¹)				(¹)						
Missouri	924	256,934,179	7,689.0	127	2	10,334,474,361	8		837	2	2	787,100,000
North Pacific	74	19,235,717	2,878.3	20		1,745,348,150						
Rio Grande-Gulf	173	85,395,562	1,029.3	25		4,326,044,153	5		2,976	13		6,882,000,000
Souris-Red	30	5,260,223	4.0			77,560,714						
Upper Mississippi	166	33,261,760	491.0		15	2,479,097,623						
Canada							179	2,794,695,000	56,133	37	15	31,593,840,000
Mexico										11		2,071,180,000
Total	2,710	2,770,636,208	209,795.1	392	49	58,406,840,966	240	4,338,509,000	99,788	112	17	80,000,000,000

¹ Not available

At last fall's national Mayor's Conference much outspoken criticism was directed at state governments for failing to provide aid in the struggle to resuscitate their cities and leadership in the protection and reclamation of the environment. Many of the mayors agreed that they had found in Washington more understanding of their problems and a greater readiness to help solve them than in their own state capitols. Relationship between city and federal government has become increasingly close as a result, causing some to predict a gradual disappearance of state government.

New York State is another story. The Hudson River Valley program, outlined in the following article, is one which, in principle and purpose, should and could be emulated by every state. Moreover, New York is the first state in the country to have embarked on a course for eradication of water pollution. The Pure Waters Act, passed by the Legislature and approved by Gov. Rockefeller on May 2, establishes a potentially effective program to stop pollution of the state's lakes, rivers and streams. Issuance of \$1 billion in bonds to provide financial aid to communities for building sewage treatment facilities has already been approved by popular referendum. The program will complement the work of the Federal Water Pollution Control Administration, providing 30 per cent state aid and offering to prefinance the promised 30 per cent federal aid for construction of the sewage treatment plants.

The state's Pure Waters Authority will also offer alternative forms of assistance: 1) contracting with communities to construct and operate sewage treatment and solid waste disposal facilities; 2) make loans to municipalities for construction of such facilities; 3) contract to provide sewage services and facilities, owned and operated by the

Authority, transferring them by lease-purchase arrangements when desired; 4) provide technical advisory services to communities for planning, constructing, operating and maintaining sewage treatment and disposal facilities.

New York has also established by law a Council on Architecture to encourage excellence in architecture and the preservation of public buildings of historic or architectural importance. The legislative findings and declaration of policy states: "It is hereby found that the various agencies and authorities of the state of New York have a special responsibility for setting standards of excellence and architectural design in the construction of public buildings . . . and that . . . the policies of many agencies responsible for such construction have tended to discourage the achievement of high architectural quality. It is hereby further found that delays in the processing of plans, bureaucratic resistance to innovation, fee levels inadequate to attract architects of outstanding ability, reliance on old solutions for new problems, combined with a widespread belief among architects that such agencies have no interest in good design, have all had an adverse effect on attaining desirable architectural standards . . ."

"It is hereby declared to be the policy of the state . . . to strive for architectural design of the highest quality in all state and other construction activities, and to make grants in aid to units of local government for the rehabilitation of public buildings which are of historic or architectural importance . . ."

George A. Dudley, dean of the U.C.L.A. School of Architecture and Urban Planning, has been appointed by Gov. Rockefeller to the chairmanship of both the Pure Waters Authority and the Council on Architecture.

Summary of significant pure waters laws, passed by the 1965 and 1966 New York State Legislature, which have statewide application.

Financial Aid or Tax Advantages:

1) Pure Waters Bond Act authorizes the creation of a State debt up to \$1 billion for the construction, reconstruction and improvement of sewage treatment plants and interceptor sewers. It also permits the granting of up to 60 per cent of the costs of such construction to local governments. The Act also allows the State comptroller to issue and sell State bonds up to \$1 billion subject to the State Finance Law. The Act was subject to a majority vote as Proposition No. 1 in the November, 1966 election and passed by a large margin.

2) Construction Aid Act provides for State aid of 30 per cent to local governments for the cost of sewage treatment works, plus the prefinancing of a federal grant share of an additional 30 per cent. This means the local share for pollution control would be only 40 per cent of the total cost. The grant is retroactive to May 12. It would be effective until March 31, 1972. The initial appropriation is \$300 million.

3) State Income Tax Laws permit deduction in the year of construction of waste treatment facilities of the total cost of such facilities by private industry. The legislation is retroactive to January 1, 1965 and effective to January 1, 1972. Such facilities must be certified by the State Commissioner of Health as complying with all pertinent laws, regulations, permits and orders.

4) Tax exemptions from local real property taxes are granted for all privately constructed industrial waste treatment facilities, when properly certified by the State Commissioner of Health as complying with pertinent laws, regulations, permits or orders. The legislation is effective from May 12, 1965 to March 31, 1972.

5) State aid provisions for small watershed protection districts applies to projects for which reimbursement made subsequent to April 1, 1963 was limited to \$20,000, to the extent of the difference between \$20,000 and one-half of such local small watershed protection expenditure.

6) Transportation Corporations Law authorizes water

and sewer companies to contract with the U. S. Department of Agriculture to operate without profit and receive federal aid under the Consolidated Farmers Home Administration Act, subject to approval of the majority of the stockholders, with those not approving to receive the fair value of their stock and other rights and benefits.

Facilitate Enforcement:

1) The one-year period before an order to abate pollution becomes absolute has been abolished. The amended law permits the Commissioner to issue orders to abate pollution and to establish reasonable timetables for compliance with such orders; provides for review by either the Water Resources Commission or the courts, but not both; eliminates independent applications to the Water Resources Commission for dilatory relief by a polluter on the grounds of financial inability or lack of known methods of wastes treatment, and reduces the time for an appeal from an order from four months to 60 days.

2) The Local Finance Law was amended by abolishing the authority of cities and villages to require that bond resolutions to finance sewage disposal or treatment facilities ordered by the State Health Commissioner or the courts be subject to permissive referenda.

3) Changes in the Public Health Law empower the health commissioner of a county or part-county health district or a city to bring an action in court for recovery of penalties provided by local law for small-scale violations of water pollution control provisions, occurring in the district or city in which the commissioner has jurisdiction, and to make other provisions as to local enforcement.

4) Changes in the Public Health Law authorize the Attorney General, at the request of the Water Resources Commission or the State Commissioner of Health, in the first instance, without prior administrative proceedings, to bring actions for injunctions for violations of water pollution control provisions, based on evidentiary matter or proof which the Commission or the Commissioner will furnish him on his request.

Establish Regulations and Standards

1) Water Pollution Control Act establishes water quality and purity standards for various classifications

of surface waters in terms of maximum permissible numbers of organisms of the coliform group. It stipulates that surface waters shall be protected by adequate disinfection of sewage treatment plant effluents.

2) The Public Health Law requires the State Department of Health to make rules, regulations and standards for testing and measuring the volume, strength and constituents of industrial wastes and other wastes at their outlets into classified waters of the State and requires such dischargers of wastes to maintain permanent records of the resulting data and to report them periodically to the Commissioner of Health; and to prohibit the use of existing or new outlets for the discharge of such wastes unless in compliance with such rules, regulations and standards and such data are reported thereon.

3) The Conservation Law fixes new provisions prescribing penalties for violations of any provisions of the Water Resources Law, or determinations or orders of the Water Resources Commission, and procedures for recovery of such penalties.

4) The Conservation Law and the Navigation Law vests the Water Resources Commission with authority, formerly in the Conservation Department and Department of Public Works, to issue permits for construction, reconstruction or repair of dams, impoundment structures, docks, piers and wharfs in any natural watercourse, and for excavations and fills in the navigable waters of the State.

5) The Conservation Law authorizes enactment of compatible local laws, prohibiting the disposal of earth, soil, refuse, or other solid substances in streams, ponds or lakes within any county, city, town or village.

Other Water Resources Legislation

The Conservation Law creates a regional intergovernmental compact to formulate provisions for planning, conservation, utilization, development and management of water resources and related natural resources of the Champlain basin, and to fix other provisions relating to the purposes, membership on the basin panel, advisory committee, budget and audit, with such provisions to become effective when enacted by the legislatures of New York and Vermont.

HUDSON VALLEY PROGRAM

The Hudson River Valley Commission was appointed by Governor Nelson A. Rockefeller in 1965, to develop a program "to enhance the river's recreational, industrial, historic, scenic, cultural, residential and esthetic values, and preserve these values for the future." In June the state legislature gave it a further directive. The legislature established the Hudson River Valley Scenic and Historic Corridor, a strip a mile wide on either side of the river, and directed the Commission to make a detailed analysis of land use in the corridor and to recommend ways to protect its scenic, historic and cultural resources.

The fate of the Hudson is inextricably linked to its tributaries and their watersheds, and in making recommendations for action — many already implemented — the Commission considered the whole Valley.

It is plain enough that the Valley is scarred. Its once clear waters have been fouled with sewage and its air is polluted. Many of the most beautiful bluffs along its shores are being quarried away; its old river fronts have become lined with rotting piers and derelict freight yards. The countryside is still lovely, but the view of it is being defaced by billboards and an uncoordinated sprawl of subdivisions.

The growth pressures, furthermore, are mounting. The state's population will reach 30 million by the end of the century, and the great bulk of this expansion will take place in the Hudson River Valley. There will be many more industrial plants, new highways, new subdivisions—indeed, whole new towns.

The growth is vital. The essential question is whether the growth can be shaped so that it will enhance the beauty of the Valley, rather than destroy it.

Certainly there are tough conflicts of interest to resolve. The important requirement is effective machinery to anticipate the potential conflicts before they reach the collision stage. To do this it is not enough to draft a static preservation plan and then meet each threat to it one by one. There must be a continuing plan for all the needs of the Valley—for industry, transportation, housing, as well as scenic beauty and recreation—and the machinery to make the plan effective.

This is why one of the key recommendations is for a permanent Commission for the Hudson Valley. It would be an inter-governmental Commission and would bring together the Federal government, the states of New York and New Jersey and local governments for a concerted effort to guide the future growth of the valley.

There need be no dispute over who is going to save the Hudson. There is work enough for everyone: The indications are strong that these many groups can work effectively together. To prepare this report the Commission asked the help of all the principal state agencies and local governments in the valley, and in a series of local hearings asked for the views and recommendations of private groups and citizens. It enlisted the aid of the

principal Federal agencies and sought the advice of Cabinet members and Congressional leaders.

For all the scars on the Hudson, the fact is that a remarkable amount of the Valley has been kept inviolate. Because of this great conservation legacy, selective acquisition can soon fill in the remaining gaps. The new water pollution control program is opening up—indeed, forcing—exciting opportunities for bringing people back to the river, and the new state park development program will provide the means to realize these opportunities.

A thoroughgoing economic base study is needed to pinpoint the economic trends underlying these population shifts. That industry is changing, spreading into the countryside, responding to new pressures, is already evident. That the service sector of employment is growing faster than industry is also known—proportionally more office workers, cooks, salespeople, auto mechanics and government workers are employed today. The impact of these changes can be seen everywhere along the River, where old abandoned factory buildings contrast with modern shopping centers and industrial plants.

Competition — nationwide competition — has affected the face of the Valley in the past and will continue to do so in the future. The population changes to be expected in the Valley are but expressions of these forces.

SCENIC AND RECREATIONAL VALUES

The beauty of the River has been seriously marred in many areas, particularly in the last 100 years. Woods have been felled, streams fouled, hillsides literally chipped away. Some of its finest scenic features have been scarred beyond healing. Nevertheless, much of the Hudson's scenic character remains intact or can be restored.

If these remaining scenic resources are to be preserved, however, prompt action must be taken. The pressures that have marred the Hudson in the past are pale in comparison to what we can expect in the future.

Scenic beauty itself is, of course, a recreational resource and the problems of preserving scenic values and providing recreational opportunities are linked in many ways. Moreover, these are but two facets of the still broader problem of preserving open land for a whole range of social, economic, ecological and environmental purposes.

The Commission staff conducted an intensive field survey of land use in and along the Hudson River Valley Scenic and Historic Corridor. The survey personnel were organized into teams, each team consisting of one man trained in landscape architecture and one man trained in urban planning. The area surveyed was somewhat broader than the statutory Corridor in most places since, in order to evaluate the River's scenic features, consideration had to be given to the total area visible from the River itself and from the roads nearest to the River on either shore. The survey area thus constitutes a *visual corridor*.

The Commission recommends a redefinition of the Hudson River Valley Scenic and Historic Corridor to correspond to the visual corridor and to include land in the Adirondack and

Catskill Parks. The visual corridor concept should also be extended to include the entire length of the Mohawk River.

POPULATION

The Hudson River drains a basin of some 13,400 square miles. The boundaries of this watershed define the Hudson River Valley as a natural entity. It must be studied as a whole, not only because water is a fundamental resource whose use and abuse have far-reaching ramifications, but also because the location of its water-courses and the nature of its terrain have been—and will continue to be—major factors in shaping our pattern of development.

Twenty-one of New York State's counties, plus the City of New York, are entirely or substantially within the watershed. Altogether they comprise some 300 towns, 140 villages and 26 cities. Their total population in 1960 was over 10.5 million. By 1985, their population will have climbed to more than 12 million. The pressure of population growth in the Valley will not slacken in the foreseeable future.

The problems, headaches, and political tug and haul that will be needed to accommodate this growth will be but an extension of the recurring urban growth crises of the past two decades unless new approaches and new concepts are found and pursued.

The area required to accommodate this growth will be exceedingly large, for most of it will be suburban in character. This will mean about: *275 square miles of new housing, 70 square miles of streets and highways, 70 square miles of commerce and industry, and 50 square miles of community facilities.*

The present population of the watershed is heavily concentrated in small areas. Not only is population concentrated in urban areas, but the urban areas are concentrated on the riverside. In all counties but one, two-thirds of all urban places are located on the River. The impact of growth is perhaps shown best by population densities. Generally, riverside towns, villages and cities located in counties on the Hudson have densities twice as great as the areas back of the River. These differences are expected to continue. In some cases the differences will become even greater.

As a result of these studies, the Commission has delineated 151 areas which it has designated as *Recreation Study Areas*. Each of the areas so designated is entirely or largely undeveloped. Each contains 1) one or more natural features of key importance to the scenic quality of the Corridor and 2) lands or natural features, such as access to water, of potential recreational value. In addition, some of the Recreation Study Areas include land whose open character is significant for environmental or ecological reasons, such as watershed protection or the preservation of fish and game. A few include sites which are important for archeological, biological or historical reasons.

In view of the rapid population increase in the Valley, the expanding economy and the pace of residential and other real estate and construction programs, it is readily apparent that if substantial portions of these major areas of outstanding scenic quality and public recreational potential are to be preserved for public enjoyment before it is too late,

funds must be provided for preserving the most critical ones in the immediate future. In the Palisades-Highlands portion of the River Corridor, there is immediate need to preserve perhaps in excess of 20,000 acres of these scenic lands at an approximate cost of 50 million dollars if the people of tomorrow are to have the opportunity of enjoying them as we do today. There is a total need for acquisition and preservation of approximately 100,000 acres of key scenic lands in the entire Valley Corridor area.

Acquisition is only one tool. Perhaps the biggest challenge lies in the imaginative use of tools to protect scenic values without wholesale public purchase. But for areas which should be parks, acquisition is in order.

It is urgent that consideration be given to the acquisition or protection of as many of these areas as possible. In some cases, land can be purchased by the State; in other cases by local governments; and foundations or private groups will be able to do a good bit of the job. The result should be a coherent system of usable open spaces.

The immediate problem is to buy time. The undeveloped parts of properties should be secured first; houses and other structures on them can be purchased later. In many cases, interests in land, life tenancy arrangements and the like can be used.

In order to accomplish these objectives the Commission recommends the creation of a \$100 million fund, with the Federal government contributing \$50 million to be matched by State and private sources.

The projected acquisitions are the anchors on which all sorts of supplementary programs will hang. If the key spaces are removed from commercial pressures now, not only will the initial costs be less; a pattern will be set that will shape and enhance surrounding residential and industrial development.

Apart from creation of the Fund, the Federal open space land program, with funds available directly to local and county governments requires only completion and adoption of an open space plan before 50% matching funds can be secured. The Land and Water Conservation Fund Program, which is channeled to the State, could also make funds available for local use. The recently passed Urban Beautification Act provides funds for beautification and improvement of the urban landscape.

Concurrent with the need for rapid action is the need to work closely with local and county governments in delineating both the specific boundaries of areas and the type of action to be taken. Additionally, other means of control short of acquisition, such as scenic easement purchase, need to be worked out with local and county cooperation.

The Commission recognizes that removal of these lands from local tax rolls can create problems. Legislative action has authorized payment of sums in lieu of taxes by the State to counties and political subdivisions in a number of areas.

The Commission recommends that provision, such as payments in lieu of taxes, be made to help local governments overcome the problem of possible losses in tax revenues through public land acquisitions.

Over the long haul, however, community

property values along the Hudson are not going to be lessened by park acquisition, but increased, and in all probability greatly so.

RECREATIONAL VALUES ON PRIVATE LANDS

Through the 1959 Open Space Act, the Legislature has already provided the necessary enabling legislation. It provides that instead of having to acquire full title to property in order to protect it, state and local governments can acquire an interest in it. The land remains in private ownership, and on the tax rolls of the community. The Act also provides for protection to the owners: it stipulates that land covered by easements must be assessed on the basis of its present use and not on potential development value. The Commission recommends that the easement principle now be applied to the Hudson Valley to secure key stretches of shoreline, streams, ridges and wetlands.

A similar tool that can be used is purchase and leaseback. Tracts can be acquired by the state or local governments and then leased back for continued private use, subject to reasonable restrictions.

Abandoned canal, aqueduct, and railroad rights-of-way can provide splendid opportunities for public walks, bicycling, hiking and horseback riding in a naturalistic setting. In all, the Commission has inventoried 350 miles of abandoned railroads and 190 miles of abandoned canals and some 60 miles of aqueduct rights-of-way.

The same shift in transportation routes that has made it so difficult for people to find a place to hike or cycle or ride has made obsolete old rights-of-way for canals, railroads and aqueducts. Here is the potential for a magnificent system of walkways and trails, some in the very heart of our urban areas.

As our population has grown and industry expanded, there has been a trend to convert free flowing streams into series of reservoirs. This has led to strong public interest in the preservation of the recreational character of streams. While it is recognized that reservoirs are beneficial and desirable for a number of purposes, there is need to supplement reservoir and lake recreation by preserving some of the free flowing streams for the special kinds of enjoyment they can provide.

The name "Wild River" has been used in recent years to denote a stream, tributary or river—and the related adjacent land area—which should be left in a free flowing condition in order to promote sound water conservation, and provide for public use and enjoyment of scenic, fish, wildlife, and outdoor recreation values.

The upper reaches of the Hudson and its tributaries qualify as Wild Rivers and the Commission recommends that they be given this status by the State.

THE LOWER HUDSON

The Lower Hudson presents a different order of problem. Along the 18 miles of the Hudson between the George Washington Bridge and the Narrows the commercial and industrial pressures are extraordinarily intense. But nowhere is access more precious—in price and in benefits. For eight million people, this is the Hudson.

This waterfront is one of the most dynamic sections in the metropolitan community. Due to changes in our transportation technology,

acreage is becoming available for industrial, residential and many other uses. Major opportunities for rebuilding and restructuring the old congested shoreline of the River are at hand. Portions of the River are shallow enough to permit extensions of the shoreline, as has been done in Manhattan for years. In total, approximately two square miles of the Lower Hudson waterfront may be developed in the next decade, spread along the New Jersey shore from Edgewater to Jersey City and on the whole lower edge of Manhattan. New York has a great second chance. As the Regional Plan Association has been emphasizing, the rapid obsolescence of so much of the dock and freight yard areas has opened up a massive opportunity for reclaiming the waterfront. There is no question that a tremendous amount of rebuilding is going to take place; scores of projects have already been drafted. The question is whether this rebuilding will provide access instead of denying it.

There has been an appalling lack of joint effort to anticipate the opportunities. So far, few of the individual projects seem planned in relation to one another, and in far too many instances they are planned for a single purpose.

A case in point is the sewage disposal plant that is to be built on the Hudson's edge between 137th and 145th Streets. Preliminary plans for the North River Pollution Control Plant have indicated that the project will be enormous in size, covering almost 22 acres. These plans have not allowed for any public use of this substantial addition to the waterfront. However, it is not too late to apply new concepts of multipurpose usage and principles of urban design to the problem of the proposed sewage plant.

Why can't the plans be redrawn? There are scores of projects which pose the same kind of questions. Is it technologically imperative that the West Side Highway be expanded into a bigger elevated roadway? Or could it be reconstructed so that it won't shut off the River? Are the new housing projects planned for lower Manhattan to follow the same mold of the housing along the East River Drive? What is the best design for the proposed expressway on the New Jersey waterfront?

Irretrievable decisions are going to be made soon. While there is still time, it is urgent that a coordinated planning effort be mounted for the waterfront areas.

FORMER FARM LAND

An average of 66,177 acres (103.4 square miles) *per year* passed out of agricultural production in the Hudson Valley between 1950 and 1959. Except in specific local instances, it is unlikely that protective measures would greatly alter this trend. A more pressing problem is ensuring that this former farm land retains its value to the total community and that the transformation to other uses occurs in an orderly manner. Many urban people have already discovered the rewards, in the form of recreation, relaxation and the quiet rural atmosphere, to be gained from abandoned land. Their activities maintain the character and value of the land and such efforts should be encouraged.

The shift of rural population from farm to predominantly non-farm elements is respon-

sible for a parallel shift in the focus of rural institutions. These changes are not always accomplished easily. For example, rural non-farmers expect and demand a greater array of community services, or expansion of present services such as improved roads, snow removal, and other urban conveniences. And farmers may find that stricter controls over odors, sprays, or flies are necessary to satisfy the esthetic and sanitary standards of their new neighbors. Many of the adjustment problems between urban relocatees and rural farmers will have to be resolved as the process of rural change goes on.

The Commission recommends that the State Agricultural Department initiate a program for the farm landscape.

Tools are already at hand, and the new Federal agricultural programs, such as the Cropland Adjustment Act, are a source of direct monetary stimulus. By bringing these various tools to bear, the State program can provide incentives to private landowners for keeping open the pastures and fields bordering roadsides, for planting trees and for the conservation of key wetlands, ridgetops and woods.

The problem of a changing rural landscape will be a continuing one. Although much is already known, there is need to secure more basic information to refine recommendations already made.

RESIDENTIAL PATTERNS

More than one-quarter million new homes will be built in the Valley's rural and suburban areas in the next 20 years. They will house the bulk of an expected population increase of one-and-one-half million people. Based on present average residential densities this added housing will require the development of 175,000 acres of land.

Without proper guidance, this development could destroy much of the scenic beauty and historic heritage of the Hudson and Mohawk Rivers. The landscape could be stripped and power poles could replace trees. Land could be leveled, septic tanks and raw sewage could pollute streams and rivers. Without proper subdivision controls towns and cities may sprawl out formlessly, leapfrogging large land parcels, costing taxpayers millions of unnecessary dollars. Each home builder and each developer, in his attempt to capture the scenery of the River, could easily help to destroy it.

But the Valley can accommodate future population and housing pressures without sacrificing the Corridor's scenic beauty.

The present pattern of sprawl enforced by minimum lot size zoning must be changed. It is monotonous and it is wasteful; it uses five acres to do the work of one and it levels the landscape in the process.

By adopting the cluster principle wherever possible, communities can induce developers to tailor their plans to the topography rather than eliminate it. The developer puts up the same number of houses that he would under conventional zoning, but by grouping them on the most buildable sections he is able to save the natural features and to deed the bulk of the tract as open space.

The Commission recommends that local governments in the Valley take the lead in stimulating use of the cluster principle.

The communities, furthermore, should not wait for developers' proposals, but anticipate them. They should provide cluster standards in their zoning ordinances, and they should designate the minimum open spaces to be provided by developers in any subdivision or urban renewal project. Special attention should be given to building height standards in the most scenic sections of the Valley.

RIVERFRONT DEVELOPMENT

As a general principle, housing should be set back from the River's shores. Not only would tight development of riverfront land forever preclude the general public from access to the water, but the construction of mile after mile of waterfront housing conjures up a vision of the worst aspects of summer vacation cottage development.

It is suggested that, as a condition of approval, local governments require any subdivision of land abutting the Hudson River or its navigable tributaries to provide public access to the waterfront to the maximum extent possible.

It is also vital that local governments zone flood plains against development, particularly along the Mohawk River, and such zoning should be vigorously enforced. Grants-in-aid to local communities for land acquisition should be contingent on proper flood plain regulation.

Zoning, as a tool for stimulating desirable forms of growth, has undergone change and expansion in recent years. Many new techniques are now available offering more flexibility in designation of land use zones and their administration.

In keeping with these new developments, the Commission recommends a more imaginative use of zoning.

TRANSPORTATION

The Hudson River is navigable for ocean-going vessels as far north as Albany. From there, traffic can continue by barge to the north and to the west on the New York State Barge Canal System.

Waterborne transportation continues to play an important part in the economy of the Valley. Although passenger travel is now limited to the pleasure boat excursions, freight movements by barge and ship are still substantial. The types of products carried are quite selective—mainly heavy bulk materials with a low value to weight ratio. Over half the freight shipped on the Hudson consists of petroleum products, with building materials, grain, sugar and molasses making up the bulk of the remainder. Much of the traffic is "one way" in character, with barges and ships returning empty after unloading their cargo.

The River can be thought of as a right-of-way, much like a railroad or highway. As boating use increases, it will become an important travelway, with recreational boaters taking excursions and vacations up and down its length—a Hudson River Waterway. If the Hudson is to retain the vital scenic character which attracts boaters and the tourist spending potential they possess, it will be important to protect the view of the shorelands in a manner similar to that of the highways. Signs, billboards and other distracting elements could sprout on the Hudson as they have on the highways. Protec-

tion is needed to preserve the scenery and views of the Hudson.

The Commission recommends that the same type of legislation proposed for the control of billboards and junkyards along highways be provided for the protection of the riverways.

Highways are the most decisive mode of transportation affecting the Valley's development over the past two or more decades. The very structure of urban development has changed to make way for movement by auto and truck with no area immune from the pervasive affects of new and expanded thoroughfares.

Because highway travel must satisfy a group of overlapping and sometimes competing needs, it is not easily analyzed or forecast. Thoroughgoing, detailed study is necessary. No over-all transportation study has been initiated for the Hudson River Valley as yet, although the Tri-State Transportation Committee is well advanced on a study for the lower River counties and other studies are contemplated for the Albany region. These studies need linking and expansion into the whole Valley corridor area on a basis sufficiently detailed to determine transportation needs to 1985 or 1990.

A coordinated, comprehensive, long range study of all major transportation facilities in the Valley is suggested, including water, rail and highway, to determine the routes and services that will best meet future needs.

INDUSTRIAL LAND

Demand for new waterfront industrial land is somewhat weak despite the fact that much existing industry is located on or close to water. Most industrial realtors can cite only two or three instances of a waterfront site being seriously considered by a prospect in the past few years. During the same period, a number of long established firms have moved away from the River to expand in less congested and less blighted conditions.

One of the reasons for the low demand for waterfront industrial land is the shortage of first class sites. Another is the current orientation to major highways back of the River. Additionally, land prices are high for waterfront property as compared with industrial values upland—which are also rising, particularly in the southern Valley area. Finally, many potential sites are blighted and would require demolition of old buildings,

land filling and the enlargement of access and parking before they are marketable.

What this all adds up to is an unparalleled opportunity. The growth trends are not for dispersion of industry along the River; they are for a concentration—a concentration which can not only make for good economics, but good aesthetics as well.

The Commission recommends a comprehensive program to stimulate industrial reconcentration and an upgrading of the old riverfront sites, and it believes that this effort can be an ideal complement to the scenic preservation of the River.

Urban renewal is the key. Typically, the most blighted areas of the older cities of the Hudson Valley include their waterfronts. The renewal projects they have embarked upon will lead to a re-sorting of land uses. The opportunities to be grasped include a restructuring of waterfront areas with

revitalized waterfront commerce perhaps sparking the renewal of adjacent business districts at the same time as new areas for industry are established.

WATER SUPPLY AND POLLUTION

Despite its impurities, several communities use the main stem of the Hudson River for municipal water supply including major cities such as Poughkeepsie and Rensselaer. New York City will be tapping the Hudson this year and several communities in Dutchess County and Ulster County are considering using the Hudson in the future. Another important use of Hudson River water is for industrial water supply, principally for processing and cooling purposes.

As the State's pollution abatement program is carried out in the Valley it is possible that the Hudson River could become a major source of public water supply. In 1955 the New England-New York Inter-Agency Committee stated that "diversion of Hudson River water to supply New York City would not conflict with the needs of other water users in the New England-New York Region until the year 2000." The recent water shortage in New York City underscores the fact that, as the demand for water increases in the Valley, the question of utilizing the Hudson's water becomes an increasingly important policy issue.

The River is simultaneously used for waste disposal and for the dumping of hot water from the furnaces of industries and power plants. Smaller streams have fared no better, for the attitude that public streams are public sewers knows no apparent bounds.

The recent approval of the one billion dollar bond issue to finance the State's Pure Waters Program is a significant break-through on the water pollution problem. The bond issue will enable municipalities to construct new interceptors and treatment plants. However, the bond issue itself will not guarantee the elimination of water pollution. Since local governments must contribute 40% of the cost of needed facilities, the participation of cities, towns and villages in the Pure Waters Program is of the utmost importance.

The Commission recommends a vigorous effort to spur full participation by local governments and by industry.

The bond issue will enable the State to help local governments finance new interceptors and treatment plants. Tax incentives will be provided for those industrial firms eliminating pollution discharges. The final result of these actions will be a new attitude toward the River, and this will have far reaching impact on development along the shores and hills of the Valley.

How man has failed in conservation and use of wildlife in and along the Hudson River is perhaps most dramatically shown by the record of the New York oyster catch from 1880 to 1963. Early reports, prior to 1880, estimated that the Hudson River and its contiguous waters contained not less than 350 square miles of productive oyster ground. Harvests of 10 to 20 million pounds were common during the early period of record up to 1904. More than 24 million pounds were harvested in 1911. The take had dropped to around a million pounds in 1958 and to 394,000 pounds in the year 1963.

As early as 1850 it was recognized that pollution by manufacturing waste was responsible for marked decline in the oyster productivity of the waters in and adjacent to New York Harbor; and, as early as 1870, that pollution by raw sewage was having an adverse effect.

A similar story can be told for other species taken over the years.

In 1935, there were 71 regular fishermen on the River. Today there are 6.

The Commission recommends that the Department of Conservation and the oyster industry undertake a joint program to develop the oyster seed potentialities of the Hudson River, and that the Department accelerate its program for the purification of shellfish in the lower river.

Following submission of the interim commission's report and recommendations, the New York State Legislature enacted legislation creating a permanent Hudson River Valley Commission and providing for a compact with the federal government and the state of New Jersey. The act contains this preamble and statement of purpose:

PREAMBLE

The state of New York, the state of New Jersey and the United States of America hereby recognize that the Hudson River, through the centuries, has been one of America's proudest assets and most important scenic, historic and recreational waterways.

The Hudson River is a vital navigable artery basic to the economy and growth of its valley and of the nation, and the optimum commercial, industrial, agricultural and residential development of the Hudson River valley is and will be of substantial regional and national benefit.

Although by far the major part of the Hudson River valley is within the state of New York, some of its most significant resources are within the state of New Jersey, and many of its resources are affected by the activities and responsibilities of the federal government.

The resources of the valley are subject to the jurisdiction of many separate federal, state and local agencies.

The interests of the eighteen million people who live and work in the valley will best be served by coordinated, long-range and balanced planning and action to preserve, enhance and develop these resources.

Recommendations of the temporary Hudson River Valley Commission that have been wholly or partly implemented to date (July 1, 1967):

Recommendation: A joint Federal-interstate Commission for the Hudson Valley. *Action:* An act authorizing New York State participation in a Federal-interstate compact passed by the legislature. Pending parallel legislative action by New Jersey and the Federal government, the act authorized an interim State body for the Hudson—this agency—which superseded the temporary Commission on June 1, 1966.

Recommendation: A system of marinas along navigable waterways. *Action:* A planning study is currently being carried on by the Commission staff.

Recommendation: A waterfront park, with

marinas and other facilities, along the route of the proposed Hudson River Expressway. *Action:* The State Department of Public Works has incorporated the suggested park development into its proposed plan for the project.

Recommendation: Use of abandoned canal, aqueduct and railroad rights-of-way for riding and walking trails. *Action:* State has authorized acquisition of the Old Croton Aqueduct right-of-way, running 32 miles northward from New York City, which will be linked with the Appalachian Trail. Additional rights-of-way are under study by our staff.

Recommendation: Creation of a State Historic Trust to receive and administer donations of land, property and funds. *Action:* Established and in operation.

Recommendation: A unified system of State historic sites. *Action:* Legislature passed an act consolidating administration of sites in the Conservation Department to be managed under direction of the State Historic Trust.

Recommendation: A unified tourist promotion program for the Hudson Valley, including establishment of a system of "Tourway" routes. *Action:* Our staff historian and a consultant are completing an inventory of sites of historic and tourist interest. Our planning staff is currently working on the "Tourway" routes which will link these.

Recommendation: An extensive program of highway beautification. *Action:* A tough billboard control bill did not pass, but the Legislature did authorize acquisition of land and easements along highways for purposes of scenic protection.

Recommendation: Acquisition of protection through other means, such as scenic easements, of 150 areas of key scenic and recreational importance, with priority to be given those in the Hudson Highlands and the Lower Hudson area, as well as a number of historic sites and natural science areas not adequately protected at the time of the Commission's report. *Action:* The State Conservation Department has allocated \$750,000 for land acquisition in the Hudson Highlands for the current fiscal year. The present Commission has recommended allocation of an additional five million dollars, to be matched by Federal funds. One area to be acquired is Little Stony Point, a peninsula opposite Storm King Mountain. A 200-acre property overlooking the Hudson in Westchester County is being donated to the County for park purposes. The State Conservation Department is also working on plans for recreational development of several islands in the Hudson River which are already owned by the State. A major historic site, the Frederick Church Estate, known as Olana, has been acquired by the State. The recommendations of the temporary HRVC have stimulated people in many communities along the River to press for preservation of other scenic areas and historic sites.

Many of the other recommendations require action at the local level. (Local government is quite strong in New York State.) There has been some progress in local moves to authorize cluster development, to clean up waterfront areas and to make fuller use of available Federal and State aid programs.

MUSIC

PETER YATES

I am interested in cusses—not lost cusses. Let those 4-letter bad words stay where they are, as terms of resort. People need the unemancipated cuss to take the place of imagination, vocabulary, when words fail them. So I am not pleased when a bunch of artists in New York and San Francisco take the lead in freeing the filthy expletive of stigma, taking it right out of the mouths of the poor in speech and leaving it no longer useful for them. Many persons of sensibility have followed too easily in the same direction; having used up the language of resentment they have turned to proclamations of “Love” and through inconsiderate misuse may wear out those words too. Cussing should be without self-consciousness or it is servile. When people don’t give their attention to it, the cussing is spontaneous; heroes and laborers may cuss freely. The terrible thing is to hear a man at the Welfare counter covering himself with his own filth out of his own mouth. Love does not show itself with proclamations and on banners but in gestures and faces.

I have before me for examination Claes Oldenburg’s boo-joies *Store Days*, handsomely published by the Something Else Press (\$10). Dick Higgins, like Jonathan Williams, though a leader among the proponents of anti-art, wouldn’t think of designing or producing an anti-book. Oh yesyesyes! Oh nonono! The contents may cry riot but not the design, paper, binding, the book package. In old-fashioned, genuine craftsmanship these are among the best books on the market. I’m not comparing them with the fine printers’ products or pretentious art books, where the package is often the purpose.

Claes Oldenburg, born in Stockholm, grew up in Chicago and New York, wanted to write, studied journalism after graduating from college, in 1952 started studying painting and sculpture, in May 1959 had his first one-man show (white objects and poems), then organized the Ray Gun Spex, a museum of avant-garde events. (An “avant-garde” is not the advance scouts of an army but the first sizeable body of the army itself). He first showed his Store at a New York gallery, May 1961, as a “mural of interchangeable relief fragments,” then moved it to an actual store on the Lower East Side, adding three-dimensional objects, December 1961. “After New Year’s 1962, it was converted to the Ray Gun Theater. Each weekend, for 10 weeks, four performances were given with a volunteer cast, of original wordless ‘plays’—a sort of cycle of rebirth.” These two experiences, with photographs, graphics, play texts, and justifications, make up the book.

Next year the Store was shown at an uptown gallery, afterwards at the Dallas Museum of Contemporary Arts. Pieces of it went on to the U.S. Pavilion of the 1964 Venice Biennale. The Store is now sold out, “its contents scattered throughout museums and private collections in the United States and Europe.” Moral: whatever it may be if it doesn’t sell—if it sells it becomes establishment art (boo-joies type). The artist’s cussing and proclamations are not to the purpose. Duchamp’s once eye-popping statement now defines the establishment (where the money is): if they show it in a museum, it’s art.

Some of the artist’s noise is to be noticed; some of it is to entangle the critics in their own categorical judgments. Critics may be slow catching on, but when they do, they solve the problem easily by setting up new categories. I am not concerned with categories or judgments, which originate as often as not with the artists’ own anti-categorical terminologies. Too many critics come along as camp-followers, patting the backs of the noisiest fronts. Some of the artists’ noise can be good common-sense, like Claes’ “The store tries to overcome the sense of guilt connected with money and sales which the artist has . . . No separation between commerce and art.” It’s a good point. Masterpiece-making really is the problem: the search for new

“masterpieces” and “anti-masterpieces” to make one quickly famous. Gustave Doré and, I presume, Norman Rockwell and Andrew Wyeth would agree: no distinction between art and commerce for them. Daumier would have disagreed, to judge by the evidence: a craftsman at all times but setting a higher and different virtue on his—therefore often unfinished—oils. Claes, boy, I write because I have something that’s damn well going to be said, and what I get paid for it is incidental to my store as it was to yours. If I yield even a little to the ever-present temptation of success—the cash comes first, and I’ve been known to do so—that’s where the cussing will be really needed, myself and the editor, too. But what I have to say doesn’t start with praising my own virtue.

Claes: “My idea of an environmental piece is that quite a large area (the larger the better) ought to be controlled—and anything and all who enter this space—by certain radiating pieces or clusters of form and color. This conception for me involves both the power of pure form and color and also my belief in magic. A great deal of trial and error and thought and care goes into making certain that these centers do their work.” And he goes on to formulate a definition of “my art,” as indefinite as the “etc.” which concludes it.

Understand: my reaction to Claes Oldenburg’s polemics and my response to his art are related but not identical areas of consideration. He is a man, mind, and artist big enough to fight with. When he writes: “*This elevation of sensibility above bourgeois values . . .*” I’m in there with him. When he goes on to the qualifying clause, “. . . which is also a simplicity of return to truth and first principles . . .” I answer that this is the usual, self-serving, dumb guff of esthetics. Whose truth? What first principles? So we meander on to the predicate of this fateful sentence: “. . . will (hopefully) destroy the notion of art and give the object back its power.” Observe that “the notion of art” is cussing somebody else’s art, perhaps anybody’s art, but not “my art.” Advertisement. And so on to the “Marlboro country” open outdoors inducement: “The magic inherent in the universe will be restored and people will live in sympathetic religious exchange with the materials and objects surrounding them.” LOVE—on banners. Puff an Oldenburg and taste the mountain-grown marijuana.

Claes writes: “I have not remained unintellectual but uninformed. Apart from ideas.” Syntactically that’s ambiguous; practically, he did put in some few years going to university, journalism and art schools. Going back to his idea that in an environmental piece anything and all who enter the space “ought to be controlled,” that’s a professor’s notion, a classroom environment. In art it had better be done by esthetic seduction. If I go to concert, theater, movie, I’ll sit still and keep quiet but not because anybody tells me to. That’s boo-joies habit. In your controlled space, Claes, I’m an explosive particle. If Kaprow tries to mow me down with his power lawnmower, I’ll do my best to wreck the damn thing. Quoting Claes again: “It is important to operate out of the forces in us, forces and counterforces and not to be afraid to use them.” Exactly. I serve notice: my forces are as good as your forces any day in the week, and if I decide to use my counterforce to meet your force—that’s how wars start. Who is the aggressor? I’m sick of ill-considered, self-serving, prating nonsense trying to masquerade as diplomacy or criticism.

To dispose of the subject: this is a good book to argue with, as are most of Dick Higgins’s books. Leaving it lay on the coffee table is as good as an “environment.” You can kick up rows with it. You can read it and look at the pictures, shutting off personal prejudice, and think about what’s in it. The book is a good study of art at the present time pretending to be “non-art.” Tell a “non-artist” he’s not an artist, and he’ll hate you. If my above-stated objections seem to you prejudiced, dear reader, that’s your business to decide. Your responses and reactions will not be controlled by me in my “environment.”

Going on now to the big contemporary sculpture show at the

L.A. County Museum. Before I pitch in, let me stop here to praise curator Maurice Tuchman, whose hard work and smart judgment assembled the show. He wanted to display a new, broad type of art he believes in. Everybody else believes in it, too, measured by the praises in newsmagazines, newspapers, and the steady attendance of common folk enjoying it. It's another Disneyland. So, in spite of the critics who say it is, it's not upsetting. No more than a fair, a toy store, a circus. What are my objections? I say, it isn't good enough on its own terms. I don't say that, for what it tries to be, it isn't a representative collection. I say that the artists try to make up by bigness and blatancy an almost consistent flabbiness of invention.

I diddled with all five fingers on Robert Rauschenberg's keyboard, which causes five big plastic wheels to revolve: push one end of the key and they revolve in one direction. push the other end and the reverse happens, but the action is so sluggish and the photographs inset in the plastic so unilluminating that, for the cost—it smells of money—it's a frost. A come-down for the bad boy of the stuffed goat with an automobile tire around it or the true artist of the Dante's *Inferno* illustrations. Many of the other big objects are scarcely worth a glance, except for their blatant bigness. Any good toy store sells better toys more attractive in scale. The huge, complaining contraption of timbers the size of telephone poles roughly slung to rotate around a crudely propped mast does impress by size, and I had a good time running under the timbers and shoving them to keep it moving and creaking, as I enjoy shoving around one of those suspended ironworks with wooden seating on the perimeter you find in children's playgrounds. The big chrome steel sheet can give you a quick sunburn. The suspended girder is a belated imitation of Bucky Fuller's girders at the Museum of Modern Art—was it a decade ago? [Fuller acknowledges his debt to Kenneth Snelson in developing the Tensegrity mast.—Ed.] The twisting sheet steel suspensions which wrap up and go boom are midway stuff, no novelty, except inside a museum. The six blue-painted plywood tatami mats, already warped by rain, raised the question whether the staff had laid them out to dry, followed by the raised eyebrow: Art? Honestly, I don't care. My pruned hedge exposing the branches is more animate. I would enjoy that hedge if I didn't know Matisse's *Dancers*.

The purpose of this contra-esthetic midway is to make anyone exclaim, Oops! Is that art? Among the brilliant debris one can find a few genuine objects to look at, sculpture of a sort. Noguchi has one hit, and a miss—something I take to be bronze imitation rocks on a bronze surface. He has done much better with real rocks. So have I, if that matters. The Calder is another of those snowplows I'm tiring of even more rapidly than I'm tiring of Henry Moore's bisected, reclining woman-mountains. The quantity of sheer trash is astonishing. How do I know it's trash? Because I simply can't recall what it was or who made it. I couldn't care enough even to be mad at it. Scarcely anything which anyone else, with effort and patience, couldn't reproduce, as the undergraduate art students are already reproducing it on a smaller scale. Camp? For my amusement, the campiest camp is such a collection as the undergraduate art show at UCLA or any university with a big art school, where practically every object, painting, or what-is-it? squirms with eclectic recollections of almost immediately preceding "major art" productions. If skill is, to be first . . . ? But you don't see reminiscent Calders, not even the mobiles; you don't see reminiscent David Smiths or Henry Moores or Noguchis. These artists, as craftsmen, defeat imitators.

For comparison, more items but on a smaller scale, one should have visited Sister Magdalene Mary's collection, at Immaculate Heart College, of automata, toys, music boxes (big ones like the nickelodeon, medium-size ones to be cranked like a hurdy-gurdy, small ones inside animated dolls), curiosities, antique detritus put together for fun, weapons, drums, textiles, puppets, now packed away until she returns, like Quetzalcoatl, to revitalize it. On a tour with her through this collection, lasting some

three hours, she pumped the handles of the music boxes (which alone you couldn't turn without effort and even so, not knowing the proper speed, to poor effect), wound up the dolls and set them out to perform, dropped dimes or quarters in the big players to start up their tack-studded rolls and beaters, constantly describing the provenance of objects at once, imaginatively lit up. The jukebox with its wealth of records by Gertrude Stein, Joyce, Cage, Partch. e e cummings, was as far out, ethnic, and wonderful as the visual objects: it was a vast prospect of the non-utilitarian imagination in delight. The sculpture show, still or in motion, couldn't touch it. With her broad charity Sister Magdalene Mary would likely have enjoyed it. She could see virtue in Dubuffet's messes.

For that matter one has only to visit the Ethnic Museum at UCLA to discover where the splendid UCLA student ceramics and textiles have their origin. And how meager by comparison the contours and textures of the sculptures show! How predictable the mirrored crawl-through in comparison with the wandering ins and outs of the better present-day concrete sculptures designed for children's playgrounds.

I make an exception for the artist of the four stuffed cloth, life-size, social figures: the terrifying hostess coming forward faceless to greet you, the slopped sister ingrown in the over-stuffed. And I make joyous exception for Oldenburg's white patent leather collapsed toilet—I suppose it's plastic, but it has the glisten and social function of patent leather—which nobody who has had to take apart a toilet and put it together could fail to react to in thought and finger touch. I'll go for his stuffed oversize shirt and necktie, but not for the sleazy-textured, bent cornucopia which might pass for cotton candy but never for the shining presence of an ice cream cone. Most of his imitation food objects are pretentious failures by comparison with the durable imitations some restaurants keep in the window or cheaply made plastic or expensively imitated plants and flowers. Or the fantasy plants some shops offer. There is a substantiality in the vulgar that Claes misses. The distinction is that we are expected to appreciate or rebel against the Oldenburg product as "art" and ask some excuse for it, which many offer all too readily, whereas the substantially vulgar asks no defence.

In the house of a collector at Cologne, every wall hung floor to ceiling with contemporary art, the best work in the house was a stainless steel panel by the entrance, having three circular doors: two slightly open and one closed and behind these three rotating cylinders—the meter box. And in a room of Rothkos at the Phillips Gallery—a large panel of one color above, a smaller panel of another tint below—the best, on the same scale, was one in grey, divided by a horizontal chrome bar, the fire door exit. If you're going to look at art and see it, you'd better look out for it. The esthetic is what the mind thinks in the presence of an object, so that if objects be art—and I with a garden full of found rock sculptures would be the last to deny it—then let us seek our own. Only the genuine master can overwhelm us, and not by size. It's the well-off boo-joies who buys "art" for contemporary curiosity or by the square yard.

This mammoth collection of current sculpture was, with a few exceptions, an outside, thundering cataclysm of ineptness. As anti-art it's self-conscious cussing with amplification. Some composers insist that amplification is necessary for their product. It is sometimes, to make heard what's in the composition but not just for noise. Noise, one of the subtlest of esthetic experiences, is drowned in its excesses. So the long history of phallic symbolism in erotic ornament winds up stale in Oldenburg's pornography, like a moosehead—uh-huh, it's a moose. All the show's pandering pornography—fortunately it was not excessive—added up to a less menacing eroticism than the one stuffed hostess.

It's not really art that is being rejected but art education. Now art education is chasing after this symbolic rejection, so what next?

In New York we stood in line to see the Andrew Wyeth show. I've been prepossessed in his favor by his surrealism of loneliness, better than Dali's self-advertising trash. But the show was a desolation of untriggered vision, with here and there something peering through like a ghost of genius.

On the third floor was the scrapwood sculpture of Louise Nevelson, a woman who spent half her life seeking a medium of vision and found it: These sculptures, painted uniformly white, gold, or black, do have a gothic verticality, balanced by grouped weight. There is an interest in picking out the numerous wooden objects, hat blocks, rifle butts, ornamentally turned posts, and delicately adjusted broken pieces of box, which have been assembled and coordinated in fruit boxes, wooden frames and cabinets to become spiritual guides, not symbols, of the imagination, standing or suspended non-representative forms which make one think of saints—but you don't need to—the uplifting golden structure like an altar called "An American Tribute to the British People." She doesn't call them saints or altars, preferring nature terms, for one of the upright groups "Sun Garden," for another "Dawn's Wedding Columns." And the cabinets replete with objects: "Dawn," "Totality Dark," "Silent Music," "New Continent." The elegiac structures: "Homage to 6,000,000 I and II," one for the Jewish Museum, one for the Israel Museum, adequate without pretense. The curving "Black Wall" and "Homage to the World," not blatant, immense. The newer constructions in plastic. One could see there in the earlier sculptures and drawings how she came to it, lost, and having found her medium and way, never turned aside. There is also the visionary silence of non-explanation, unneeded in presence of her controlled space. She was prepared to wait her time, not defending what she had done. Until finally one could come before and enter by imagination the black "Sky Cathedral," as I first encountered it at the Museum of Modern Art, and walk among the uprights on mirrors, under the hanging uprights, beneath the circular disks of her most extraordinary creation, the "Tropical Rain Forest," completed this year.

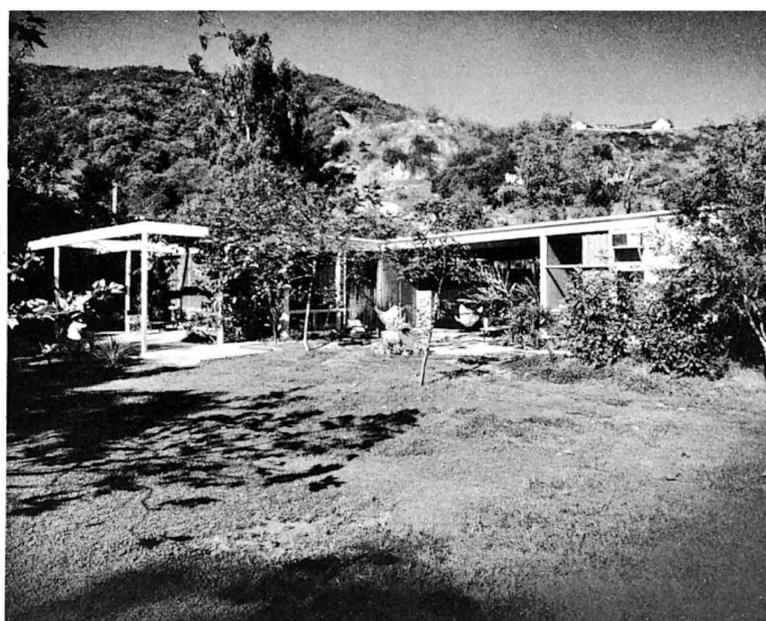
The work of Louise Nevelson stands silently in judgment apart from vogue, non-art, self-serving clamoring of self-appreciation, blatant bigness. Small or large it is always the right size, asks nothing of us, asserts only its sufficient presence. The catalogue photographs do it no justice. The play of light and shade within these dimensions is too architecturally rich to be reproduced on a flat surface.

I should note for a postscript that many items of the sculpture show were fabricated with the aid of industrial equipment and technical advice. The collaboration of art and manufacturing, pioneered by Long Beach State College at a sculpture symposium a couple of years ago, aims in the right direction. The symposium sculptures remained on the campus, in general well placed and enjoyable, though there is probably not one "great work" among them. Better than carved politicians and they blend or contrast within the landscape, as the bronze politician won't. I'd venture to guess that any of the sculpture show components would add gesture in a playground, a landscape, on a mall, leaning up against a building. I'd like to have that rugged timber "Elohim" down on the lower half-acre, if I could afford it. But so does a stripped fire truck add gesture, a locomotive, an abandoned section of concrete pipe, a tree trunk vertical or horizontal. The selection of sculptural "masterpieces" spread around the walls and walks and concealed in the shrubbery of the large walk-around at UCLA dedicated as the Sculpture Court does add pleasure to each vista, but the worth—by other estimate—of each item in the collection cannot be judged by its effectiveness on the site. David Smith's glistening, uncolored metal composition stands at the hub, effective from every angle but from the west, both compulsive and repulsive when the late afternoon sunlight exaggerates the—I'm sure, unintended—effect of a large, bare, glistening funerary cross.

WATER AND POLITICS

United States in the early 1830's he recognized that the administration of public affairs in the United States was "full of animation and effort" mobilized in diverse forms of collective enterprise. Today, a de Tocqueville might find the California water industry to represent a further fruition of an American system of public enterprise fashioned by a free people in solving their common problems of water supply.

Water and Politics—California Style has provided the circumstances for fashioning a complex of public enterprises into a dynamic water industry. Ironically its problems are not those of inaction and under-development but of over-production and over-development. A few changes to better proportion the calculation of risks and of costs may lead toward a more efficient performance. It is easier to draw in the reins of a dynamic system of enterprise than to induce the release of productive energy in the absence of enterprise.



Half acre site in southwest Laurel Canyon area of Los Angeles. Architecture by Van der Kar, garden by Garrett Eckbo. Three bedrooms, two baths and large living room plus a large studio with bath. Unfurnished. Built in 1952, new roof in 1966. \$60,000. Available July, 1967. (213) 466-5191 weekdays 9-5.

books

MUSIC REVIEWED 1940-1954 by Virgil Thomson (Vintage paperback, \$1.95) arrived with the mail at 11:30; I have been reading in it continuously, the time is now 2:30, and I am prepared to assert that no one writing music criticism in English since GBS has so mastered prose as a pointed weapon to deliver, within the reviewer's short space and shorter time, the thrust of his mind. So extreme is his assurance, I had almost convinced myself he had eradicated the deliberately contrived misrepresentations and venomous inexactitudes which are as persuasive as his unhesitating knowledge and deft rhetoric. A quick check showed he has not. His first review for the New York Herald Tribune is as brutal as ever and as deceptive: "I realize that there are sincere Sibelius-lovers in the world, though I must say I've never met one among educated professional musicians"—deliberately putting out of mind his friend, Sir Thomas Beecham. Followed at once by the venomous inexactitude: "As a friend remarked who had never been to one of these concerts before, 'I understand now why the Philharmonic is not a part of New York's intellectual life.'" Within the week his clubbing of Sibelius had been quoted across the continent. The borrowed rapier thrust against the Philharmonic began a fight with poison and unbated weapons involving as many characters as the last scene of *Hamlet* but of 15 years duration. He didn't perish in it, although during the first two years of his tenure with the newspaper his enemies spared no intrigue to obtain his exit.

My first paragraph is a warning: you must never cease being on guard against Virgil Thomson at his worst. His weakest he has excised from these selections. What is to be admired is his amazing strength, sentence upon sentence for 460 close-printed pages. And you must never confuse his worst with his deadliest. Reviewing Hindemith's best symphony, *Mathis der Mahler*, he drags him like Hector around the walls and leaves him finished. Against men he admires whose work he cannot stomach he is as merciless but more courteous, propping the battered victim on the field of battle to offer him a compliment. The farther prospect enables us to observe that in several capital instances it was his own lips bit the dust. Withal you must be cautious of his prejudices, inclusive but invariably admitted, and of his sparing gentleness toward several friends.

Having distributed my warnings, let me now say he is a master of the art of praising. He praises often, adequately, and for the right reason. Though he seldom breaks into an aurora like our mutual friend, Alfred Frankenstein, he is more complete and explicit in his praising. One can seldom disagree with Alfred's praises, they are from the heart. One can many times disagree with Virgil's praises, which are of the mind and sometimes misinformed; disagree or not one is the better for having read them. To a young critic who wishes and usually needs to learn his job, I can recommend no better self-education than to read these pages with an undeviating alertness.

Virgil Thomson is first and best a composer. There his intelligence shows itself broadest and least waspish. He learned from Erik Satie and made his own the serenity of an untrammelled music. But the New York scene needed, when he came to it, a critical fighter as unafraid of power and reputation as of error, a Lancelot ready to attack real giants and undeceived by windmills. He knew that the giants could be only pricked and not disposed of, but he pricked them sore. He opened up new areas of musical criticism, in the tradition of his predecessor, Henry Krehbiel. He understood the business of music, secular and sacred, and made sure his readers understood it. He has left for future readers models of critical writing so exact in circum-

stantial statement they will not go stale. For comparison, I must admit that I have spent writing these four paragraphs three times the hour he was granted for the writing of a review of equal length.

Having devoted so large an allotment of time to so few paragraphs, I had not expected to write more. Yet the book kept reopening itself in my hand. I decided at last that, if these small essays could fascinate my attention not only by my unceasing argument with their content but by the grace of their shape, I should offer here for an appendix some idea of that shapely grace. The right choice among them fell in sight this morning: six paragraphs on a performance of Bach's B-minor Mass.

Verse One gives the facts: a three-hour uncut performance, "no fatigue . . . no sleepers," and duple compliment in the superlative register, concluding, "How Mr. Shaw worked his miracle on this most recalcitrant of pieces is the subject of this morning's sermon." Verse Two then methodically analyzes the miracle; Verse Three, the effect. Here, where the ordinary critic would have lumped his compliments and where Alfred Frankenstein would have lit the heavens with his aurora, Mr. Thomson, taking up lyre and laurel, performs an apotheosis. It is the moment when we may expect to react in joy or fury.

"The whole turns out to be . . . not at all a giant Lutheran cantata, nor yet a liturgical Mass, but a grand and sumptuous court oratorio on the subject of the Mass. Its grandeur lies in its vast proportions and in its completely simple expressivity, its sumptuousness in the extreme and formal floridity of its musical texture. Its layout is huge but perfectly clear; its style is the ultimate in ornateness. It is at once enormous and graceful, like the palace architecture of its time, complete with gardens, ponds, statues, and vistas."

Next ensues a commendation of the spirit and style of the performance, quite distinct from the earlier methodological analysis. "His rhythmic alacrity evoked a court ballet. The '*Cum sancto spiritu*' that ends the Gloria was as gay as a hornpipe; and the bass aria, '*Et in spiritum sanctum*,' . . . tripped along none the less reverently for being light on its feet. Just as the alto Agnus Dei might easily have rocked a cradle."

Continuing thus into the finale and summary of Verse Six. ". . . If Mr. Shaw and his admirable colleagues will give us such a performance annually, Bach's choral masterpieces will cease in short order to be merely edifying and become humane, as I am sure . . . they were conceived to be. The sacred music of the great masters is not designed to shake humanity; that is a function of the theater. It is made to please God by fine workmanship. This one was planned, as well, to get its author a job at the Saxon court."

Note the final stinger. Note also that Mr. Thomson has failed, though himself a composer of liturgical works, to observe that however Bach may have wished to please God by his workmanship he was equally concerned to expound in musical dissertation, clause by clause, a precise demonstration of significance "on the subject of the Mass." The Mass is a succession of ritualistic gestures matched with words; Bach reinforces words and gestures by the disposition of his music, rendering the Mass theologically Lutheran. This, apart from any thought of palace gardens or his hope of pleasing the Saxon court, is why the Mass in B minor is so long. And with Bach, the Holy Spirit, that aspect of the Trinity which communicates directly with each individual, is shown always light and airy—as a secular poet conceives Ariel or a materialist the functioning of an aerial.

Listen again! It is two days later, and I have completed my morning stint of stand-up reading. ". . . And if you want to hear the French singing style as Jean de Reszke invented it, as Muratore and Mary Garden practiced it, you will have to elbow your way into Town Hall the next time Maggie Teyte gives a recital. "That style is based technically on being able to sing any vowel in any color and at any degree of softness or loudness on any note of one's voice. It is based interpretatively on reading

aloud. It is intoned elocution that uses so large a variety of vocal coloration that in no single piece is the gamut ever exhausted. Each song is a little drama, a slice of life that takes place in its own poetic climate, uses its own special and appropriate palette of sound. This vocal impressionism is of the utmost auditory richness, and also of the most intense poetic clarity. . . . It is as if somebody were singing very beautifully and reading very beautifully at the same time . . ."

Most people believe that real poetry has no more place in critical reviewing than gin in bathwater. Or that the lyric flight must be shot down by the prosaic fact. I submit that the lyrical intensity of the passage I have just quoted as skilfully outsings the common lyric as its subject outsang for many years all other sopranos, with Scottish poesy and practicality, in her peculiarly French art.

We come now to the Areopagite: a three-in-one manifestation, testifying to the sophistic Greek censorship of Socrates for opposing the prevailing ideas held by the educators of Athens; testifying to the moral authority of pseudo-Dionysius, whose writings transmitted Neoplatonic, pagan ideas to the medieval church; and testifying to the *Areopagitica*, Milton's treatise against censorship.

"A newspaper man once advised me, 'Never underestimate the public's intelligence; never overestimate its information.' The moral of this for the critic is that he does his duty best by his readers when he describes and explains to the public what the artist is doing. If he adds a paragraph of personal opinion, that is his privilege as a musician. It is also his duty as a reporter, since the confessing of his personal prejudices and predilections helps the reader to discount them. . . . If the reviewer is not to be mistaken by artists and managements for just a cog in their publicity machine, neither should he set himself up as a Bureau of Standards. We still live in a Republic of Art, thank God . . ."

". . . Music is purely a cultural and educational manifestation and forms no part of the entertainment trades, of show business. On the contrary, it is esteemed beneficial like religion . . . good for the body, the feelings, and the mind. A further presumption that it can also lift up the soul, though rarely stated, is ever present in the American view of life."

One could have a worse guide through the Inferno.

INSIDE THE ENDLESS HOUSE: *Art, People and Architecture, A Journal* by Frederick Kiesler (Simon and Schuster, New York, 1966; \$15)

I have been fortunate in my acquaintance with great artists. I don't claim intimacy. To be intimate with a great artist is to be used and perhaps cast off—a different thing than being useful. Within the gravitational attraction of a powerfully creative mental cosmos you have to be prepared for the shock, or retrojet, of disagreement which will keep your own small planet, or satellite, on its course, circling but not plunging to annihilate itself in the greater mass.

Intelligences of prime creative orientation create books as deceptive as fascinating—sometimes repellent. Knowing itself in its unique consistency, the intelligence will shape fact and philosophy and friendship to its own cosmic image. Powerful, uncontrolled destructive urges crouch, mindless as dragons, in the fire flower of their breath before the entrance. Incautious explorers wisp up in a spurt of gas.

The prime creative substance multitudinously informs itself in a state of continuous question and answer. It cannot know itself from without but gives out from within itself shapes indicative of its interior consistency. The shapes are informative and deceptive. A primary intelligence is not wise, that is, able to arrange the facts of the case to its own advantage. It is itself a complete cosmic wisdom, opposed to any facts but its own in its own case: a unique cosmos arguing within total cosmos. Such a mind cannot perceive in humility the total cosmos, because in its unique condition it has all the information it can work with in the presence of God.

Frederick Kiesler's heavy book, self-designed with ample spaciousness of white page and print, records for the years from 1956 to 1964 this endlessly informative process of self-assertion, self-information, and self-doubt.

Born in Vienna, a citizen of European culture, Kiesler lived on the 22nd floor of the same New York apartment building some 35 years until his death. Like other creative thinkers of his lifetime he traveled more often and more rapidly over greater distance as he grew older, being plunged into shocking contraries of immediate experience. Unlike some others who must blur incommensurable distinctions into abstract or violent images afloat on chaos or confusion or the reassurance of liquor, he saw with an extraordinary visual acuity, abstracted purposefully and set forth with concise mastery in his second language. We are able to read him with no translation but that of his own mind.

The journal of his book is made up of intimate scenes with wife, friends, professional associates, sexual companions, acquaintances of reputation and of business; recorded conversations; descriptions of the scenes and persons of travel, more rewardingly contrived than fiction; reflections on these experiences; description and discussion of his few principal creative works around which his life flowed tidally; lectures and exhortations to mankind and to his fellow craftsmen, sometimes murky; denunciations of professional artists and architects; an embittered but discerning exposition of human, esthetic, and commercial frailty; all these interspersed with similar material in concentrated free-form lyrics and summarized in epic fragments not unlike Buckminster Fuller's similarly chagrined, furious, and witty epic verse. Except the few argumentatively choked passages, it is completely readable. It is indeed a companionable education. And there are exactly enough illustrations expressively drawn in his own scribble.

We know there are exactly enough illustrations, because the book was in process of assemblage before he wrote the last entries, and he tells when he realized he must draw more illustrations for it. The book, dedicated to his first wife, was completed by his second wife (or a relative?) and a longtime assistant after his unexpected death, December 27, 1965.

Kiesler was an artist in thought, his works the rock coast of his thinking. I do not mean that the thought was of greater significance than these works. But the book title is indicative: *Inside the Endless House*. Year by year he grew more aware that the self-containing experience of life that art should be, the totally humane space for living which architecture should be, had been supplanted by the philatelic collections of the museums, by the functional factories of enclosed cubicles—the structure still primitive in steel post-and-beam, the one dubious improvement the exposure of human privacy by walls of glass, while the spirit hides behind slats and curtains. For functionalism he hadn't a good word.

The Endless House was a model of humane architecture several times reconsidered and remodeled, often exhibited, ideas stolen from it and commercialized, constantly offered to mankind, of which wealthy dilettantes improvidently tasted promising a contract and then sneaking out. At the end of the book there is a double-page photograph of Kiesler, a face of infinite sadness, leaning upon a small, unfinished wire and plaster model of the Endless House.

The same face, older, more embittered, yet, one believes, wiser, looks obliquely beyond oneself from the black book jacket.

The autobiography of his successful failure to achieve objective recognition as architect and sculptor is mitigated by one ultimate triumph, carried through against every bureaucratic obstacle, the Shrine of the Book to house the Dead Sea Scrolls outside Jerusalem. He saw the Shrine in construction, rescued it several times from error but did not live to see it complete.

His genius, as I read him, was a superlative self-awareness that could occasionally become externalized but which he could never finally fix into an object dis severed from himself.



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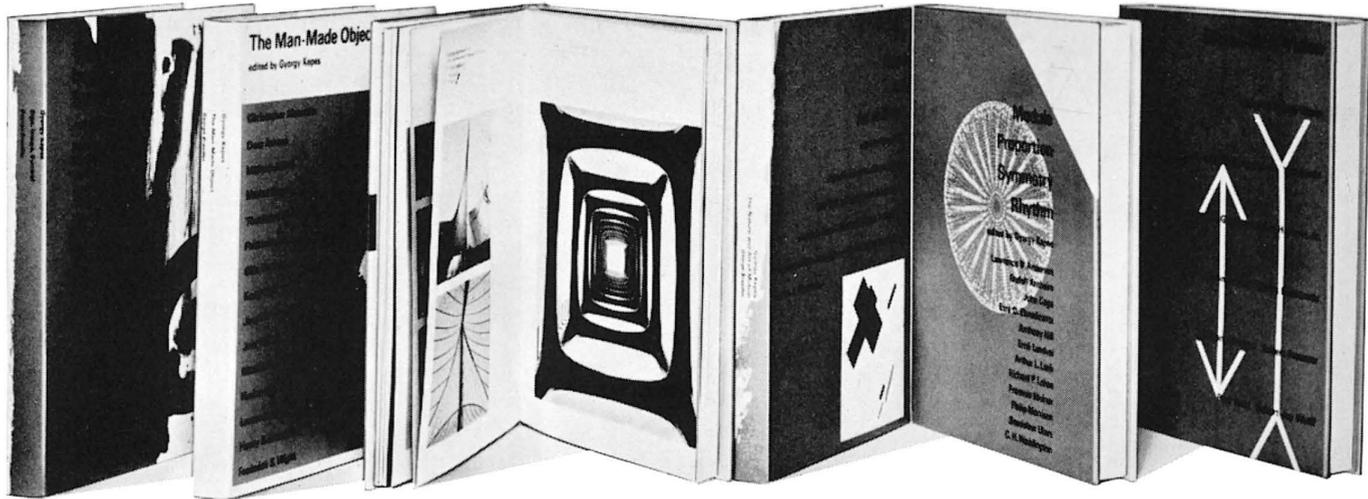
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