THE HIGHLANDS VOICE

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Conservancy Enters Hominy Creek Controversy

by John Purbaugh

From laurel-choked headwaters in Greenbrier County through southeastern Nicholas County to its confluence with the Gauley River, Hominy Creek drains a remote and beautiful corner of the state. Known by local old-timers to once be populated by native brook trout throughout its length, Hominy Creek today is considered by many fishermen to be a valuable wild brown trout fishery. Introduced as fingerlings since the early 70's, these wily fish have established reproducing populations in several stretches of Hominy.

The once-productive stretch from Carl to the Mt. Urim Church is now orange with iron sedimentation. Although there are periodic small iron seeps on the banks along the length of Hominy, none visibly affect the instream water quality for more than a few feet. The large coal refuse pile at Westmoreland's Quinwood preparation plant near Carl is belived by many Trout Unlimited and Conservancy members, locals and *some DNR employees to be the source* for the larger iron problem.

Even though resolution of the problems at the existing refuse pile is not complete, DNR has announced its plans to permit construction of a new refuse pile on Blue Branch, a small perennial tributary of Hominy, with discharges into Hominy Creek itself.

The Highlands Conservancy and Trout Unlimited have both commented upon and objected to the permit as presently drafted because it will eliminate a perennial stream, because iron discharges allowed by the permit are too high to ever achieve improvement of the receiving stretch of Hominy Creek, and because of deficiencies in the design of the pile.

A public hearing on the permit is scheduled for 7 p.m., Monday, July 16, 1984, at the municipal building in Summersville.

One amazing aspect of the proposed new refuse facility is that Westmoreland has already begun construction and disposal of refuse at the Blue Branch site, before receiving *a water pollution control permit. As a result of efforts by Conservancy and TU members, DNR has asked that construction be temporarily halted during the permit review process, so the issues raised can be meaningfully reviewed.*

If time and other factors permit, a brief tour of the area may be scheduled for the July meeting of the Board of Directors.

W.Va. Acid Rain Committee Releases New Study

WVHC joined with WV-CAG, Trout Unlimited, the Sierra Club and the state chapter of the American Lung Association in a June 7 press conference marking the release of a new study on acid rain in the South.

The study, prepared by the National Clean Air Coalition and the Friends of the Earth Foundation, draws attention to the broad effects of acid rain. According to WV-CAG Administrator Nancy Buckingham, the study shows that "we in West Virginia can no longer afford to believe that acid rain is just a Northeast problem."

Much acid rain publicity has focused on the damage to lakes in New England and eastern Canada from the effects of lowered pH. The findings in the new study, which draws together data from 140 scientific studies, outlines the damage and continuing threat to southern waters, forests, soils, crops, health, visibility and buildings and materials.

In West Virginia, a fourth of the fragile trout streams are acidifying, causing a decline in trout populations, and already over 100 miles of remote streams in the Monogahela National Forest can no longer support fish. Fish stocking must often be delayed during periods of heavy spring runoff to allow acid levels to recover, the report says.

"Damage to the South's forests, crops, and soils may prove to be even more serious than the damage to its lakes and streams," it continues. Studies have shown both direct damage to foliage and a decline in production for such economically important crops as cotton, tobacco, soybeans and timber. In a specific example, the report said, "Tree rings on Mt. Mitchell in North Carolina show that growth over the most recent 21 years equals a mere 4 years of growth during the period from 1958 to 1961.

Acid rain reduces soil quality by leaching out nutrients needed by plants and by causing chemical reactions which release toxic heavy metals into ground water in a form which can be taken up by plants.

Soils vary in their buffering capacity, the ability to neutralize acids. Many southern soils have a limited buffering capacity, one which will decline rapidly under continuous doses of rain with acid levels above those of normal rain. "Some will lose their capacity within 8 or 10 years, allowing acidic water from rainfall to run off unchanged into nearby streams," the report says.

Reports on the press conference were carried by both the **Charlston Gazette** and the **Charleston Daily Mail**. The **Daily Mail** story highlighted criticisms of the report by Edison Electric Institute President William McCollam, Jr., who "called the report 'extremely misleading' in its 'selective use' of information," and stated "that 'no responsible group has come to the same conclusions' summarized in the report." McCollam represents a lobbying group that opposes legislation to control acid rain.

WVHC's Perry Bryant said, "This study shows that acid rain is a national problem, and needs to be solved and funded at the national level."

The WVHC and other members of the W.Va. Acid Rain Committee support the Waxman/Sikorski/Gregg bill, HR 3400. The bill calls for a 10-million-ton reduction in sulphur dioxide and a 4-million-ton reduction of nitrogen oxide by 1995. The program would be funded by a national tax on electricity and contains provisions designed to protect the coal industry.

The bill failed when the House Subcommittee on Health and the Environment voted 10-9 to remove the acid rain provisions for HR 5314, the comprehensive bill to reauthorize the Clean Air Act. Further action this year is doubtful, but widespread concern about acid rain is expected to keep the issue very much alive.

Summer Meeting: Head for the Gauley

Plans for the WVHC summer board of directors meeting are finally on track, or at least on foot. Although President Larry George has been trying to schedule a special treat for members who attend the July 28-29 meeting at Summersville, last minute word came down that the special train excurison could not be made that weekend.

CSX Corporation told George in mid-July they would like to cooperate with the Conservancy by providing the train, but conflicts with coal train schedules forced a delay.

Conservancy members are used to relying on their feet, however, so the Saturday trips will carry them off into the wilds under their own steam. One trip, leaving from Nicholas County Memorial Park at 1 p.m., will be a hike down into the Gauley Canyon on one of several trails. The second trip, same time and place of origin, will take members to the Hominy Creek area in Nicholas County where they can see the Westmoreland Coal Company's refuse pile, the subject of John Purbaugh's article in this issue.

Plans to invite Congressman Bob Wise to speak on Saturday evening were stymied by an admittedly pleasant conflict. The 28th of July will be Congressman Wise's wedding day. Apparently, the hike into the Gauley was not what he had in mind for a honeymoon.

Members and friends will be on their own for meals, but festivities at the park will resume about 7:30 with music and a social hour. Committee meetings will be held at 9 p.m. for those inclined to business. The park also has tennis courts.

Bunks will be available at $2.50 per night, providing you bring your own linens. Hot showers are provided. Though reservations aren't essential, if you wish to make sure of a space, write Larry George (731 5th Ave., Huntington 25701) by July 25th.

The board meeting will begin promptly at 9 a.m. Sunday morning in the 4-H Building located in the park about 300 yards off Rt. 19.

To reach the Nicholas County Memorial Park, drive about two miles north of Summersville on Rt. 19. Hope to see you there!

From The President

by Larry George

New People

I am pleased to welcome Ray Ratliff and Cindy Rank to the Conservancy Board of Directors in their new positions as Directors-at-Large. Ray and Cindy were nominated by myself for the two Director-at-Large vacancies and were unanimously elected to those posts by the Board of Directors at its May 6th meeting.

Ray Ratliff is a trial attorney with the Charleston law firm of Kaufman and Ratliff in which he practices with fellow Conservancy member, State Senator Tod Kaufman. Ray is the husband of **Voice** Editor, Mary Ratliff, and since 1970 has represented the Conservancy in lawsuits concerning the Canaan Valley and Cranberry Backcountry. Upon his election, I appointed Ray as Chairman of the Conservancy's New River Conservation Committee which is discussed below in more detail.

Cindy Rank is also a long time Conservancy member who resides in rural southern Upshur County. Cindy has been a leader of Mountain Stream Monitors for many years and has specialized in surface mining and water quality issues, particularly acid mine drainage, as they affect central and northern West Virginia. Cindy has been a familiar face at the Legislature and at state and federal hearings on environmental regulations since 1977 when she began her work in this area. Some of Cindy's best work has included the 200 page report prepared by her on behalf of Trout Unlimited concerning sediment pollution problems at the Snowshow Ski Resort in Pocahontas County. This report resulted in extensive news coverage of Snowshoe's disregard for any attempt to control construction related soil erosion on its property and resulted in the appointment of a Special Prosecutor by Circuit Judge Lobban to prosecute Snowshoe officials for willful and wanton stream pollution.

River Conservation

I am sure Conservancy members have noticed the new emphasis in the **Voice** on articles dealing with conservation of West Virginia's rivers. This is the result of a new direction taken by the Conservancy Board of Directors and its officers during the past six months which has made river conservation one of the Conservancy's priority goals. Basically, the Conservancy is pursuing a new strategy to protect our state's streams which is unique to West Virginia and relies on a cooperative effort between government, private landowners and environmental organizations such as ours to develop a river management plan.

To pursue this strategy, the Conservancy has applied to the U.S. National Park Service for a grant under the NPS River Conservation Technical Assistance Program to enable us to "broker" a management plan between all interested parties on a given river. Under this program, the NPS will provide funding on an approximately 4 to 1 matching basis as well as professional and technical assistance to non-profit environmental organizations which desire to pursue the management plan approach. One of the essential elements in this approach is obtaining the support and financial backing of the appropriate state agency, in this case, the West Virginia Department of Natural Resources.

(Continued on Page 3)

From The Editor

The Summer months must be designed to try our souls. We count on things to happen quickly in June, for our corn to grow and our rivers to run fast and our vacations to finally come around after a year of waiting. So this year everything slows down and dries up. No rain, no rivers, and almost no **Voice**.

We apologize for the long delay in the June issue, which left Charleston before Memorial Day, and came back right after because the editor had gotten hasty with the address labels and had her mind on the upcoming weekend at Cannan Valley, North Fork Mountain and the South Branch of the Potomac. Who could help but get the return label in the middle of the envelope with such prospects?

The copy went right back out, this time to Glenville, but alas. The beleaguered folks there couldn't proceed without last months sheets from Elkins. Etcetera, etcetera. We can only say we're working on our imperfect systems, and hope to have a much faster turnaround before fall.

The July issue will go out—we trust before the middle—in time to warn you to get in shape for the summer meeting. The August issue will depend on how many people survive the drought and the summer meeting.

By September we'll be looking for a lot more of you to pitch in on the writing, news gathering, and general commentary. We're still looking for a designer. Thanks to those who have volunteered to be "clippers," but we have no one yet from Clarksburg, Parkersburg, Beckley or Huntington. Surely we have news-addict members in those remote territories.

In late summer we'll be starting a Class VI membership drive (which you'll understand if you're into rivers). Our continued growth as an organization depends a lot on the news of Conservancy activities both through the **Voice** and the papers around the state. People can't join us if they don't know about us. Why not pitch in now? Right now while you've got your feet up and are sipping that lemonade.

Find a sheet of reasonably unused paper, a stamp, and a pencil. Send us your ideas, your questions, your want list for stories. Send us your commitment, your scout's-honor promise you'll give more time to the Conservancy this fall.

We want to be the strongest, soundest, most effective environmental group in West Virginia. When will that happen? As soon as **you** become part of the action. That's when.

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From the President...

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The management plan approach has been utilized in many other states across the country and has been an alternative approach in those states where federal wild and scenic river designation by the Congress has not garnered adequate support to attain the passage of river legislation. West Virginia is such a state, as the 1983 NPS reports on the Gauley, Greenbrier and Bluestone Rivers have indicated. In those reports, the NPS found all three rivers were more than qualified for federal wild and scenic river designation by the Congress; however, a lack of local support for such designation prevented the NPS from making a favorable recommendation to the Congress. It is the hope of the Conservancy Board of Directors that the cooperative management plan approach will avoid the same negative reaction on the part of local landowners and government officials generated by proposals for federal wild and scenic designation. This approach has the advantage of giving both environmental groups and local interets the opportunity to develop the management plan prior to its implementaion, thereby avoiding control of the river by the federal government.

The goal on the Conservancy's river conservation efforts will be to implement a management plan for the state's outstanding rivers, i.e., Gauley, Greenbrier and Bluestone, through the use of tax incentives, local land use controls, purchase or contribution of private property or scenic easements, cooperative agreements with private landowners and a comprehensive state/river management program.

During April, Ray Ratliff, John Purbaugh and I met with DNR Director Dr. Willis Hertig and obtained the initial support of the Department of the Conservancy's efforts. At this time, it appears that the Bluestone River in Mercer and Summers Counties will be the first river to be the focus of the cooperative management plan approach. The Bluestone is among the state's most outstanding scenic rivers and there is substantial local support for its protection. Although no final decision has been made, it appears that the Bluestone would be the best river in the state by which to attempt this new approach since the likelihood of success there appears to be quite good. DNR has suggested the Bluestone as the first river and the consensus appears to be developing among the state's other major environmental groups to that effect. Both the Gauley and Greenbrier Rivers represent important but also very challenging rivers even for the cooperative management plan approach and it is the judgment of the Conservancy that it is best to attempt a river such as the Bluestone to demonstrate the potential of this program.

The Conservancy's application for a NPS river conservation grant will not be ruled upon until this fall. In the interim, we will continue to build a consensus for the Bluestone River and lay the foundation for later work on the Gauley and Greenbrier when our work on the Bluestone is completed.

Membership Fee Increases

At its May 6th meeting, the Conservancy Board of Directors voted unanimously to make a 50% across the board increase in several individual membership fee categories. The regular membership fee will increase from $10 to $15, the associate category from $20 to $30, and sustaining membership will remain at $50 annually. The membership fee for organizations was increased from $20 to $50 annually. This new membership fee schedule will take effect on July 1, 1984.

The existing Conservancy membership fee schedule has been in effect since January 1, 1980. I recently requested the Board of Directors to increase these fees to compensate for 3½ years of inflation and increased financial demands. During the past 18 months, the Conservancy has taken on some new programs and made improvements which have resulted in increased fixed operating costs. The cost of publishing **The Highlands Voice** has increased from just $2,000.00 annually a few years ago to over $5,000.00 today. With publishing and layout improvements to be made over the summer, the annual cost of the **Voice** will rise to over $7,000.00 annually. The **Voice** has reached a new standard of quality in publication during the past year which we hope the membership and the public-at-large appreciate and find worth the extra cost.

The Conservancy has also recently enhanced weekend membership programs which has resulted in increased membership participation in the organization. The Conservancy has also increased its efforts in representing the organization and its natural resources conservation interests before the West Virginia Legislature and the Congress as well as state and federal administrative agencies. On specific issues the Conservancy, as detailed above, is making a priority effort for river conservation on the Bluestone, Greenbrier and Gauley Rivers as well as maintaining our longstanding commitments to the Monongahela National Forest and monitoring mining and water pollution problems.

I believe the Conservancy's expanded weekend programs and activities on a wide variety of issues makes it one of the best bargains in environmental organization membership anywhere in the eastern United States even with the new membership fees. Conservancy membership has increased 15% in the past six months to nearly 700 members which represents a continuance of the longstanding trend of membership growth. I hope that Conservancy members will understand that these membership fee increases are necessary to maintain our organization and that you will continue the strong support you have given us for the past 18 years.

Cranberry Wilderness and Pocahontas County Schools

On January 13, 1983, President Ronald Reagan signed Public Law 97-463, the Cranberry Wilderness Act, creating the 35,550-acre Cranberry Wilderness, the largest federal wilderness area in the eastern United States. The President's action followed a nearly 14-year battle between conservationists, the private mineral owner, CSX Corporation, and local opposition. Although the CSX Corporation changed its position in the early 1980's and decided to support the Wilderness bill, Pocahontas County officials continued to oppose it since their County would lose the tax revenues from the privately owned minerals once they were to be conveyed to the federal government upon wilderness designation by the Congress.

In the summer of 1982 with four months left to attain passage of the wilderness bill, CSX, the Conservancy and the Pocahontas County Commission reached a compromise by which the conservationists and railroad would support an amendment to the wilderness bill providing Pocahontas County with $2 million and Webster County with $2 million as payment in lieu of tax revenues by the federal government. The Conservancy and CSX Corporation agreed to support the compensation amendment in exchange for the County Commission's support of the wilderness bill. The Conservancy also supported the compensation agreement on the grounds that it was fair and reasonable that Pochontas County, one of the poorest counties in West Virginia, be fairly compensated for the tax revenue loss that would occur upon wilderness designation.

Both Senators, Robert Byrd and Jennings Randolph, were supporters of the compensation amendment which they sponsored successfully and which became law with the wilderness act on January 13, 1983.

This Spring, Pocahontas County received its $2 million check from the federal government for the payment in lieu of tax revenues. Of the total, $1.5 million was given by the Pocahonta County Commission to the Pocahontas County Board of Education which is planning to use the money to construct a new Pocahontas County Middle School at Hillsboro. The remaining $500,000 has been placed in a permanent fund by the County Commission which will be used to support a variety of special projects for the long term benefit of Pocahontas County.

I served as the Conservancy's chief lobbyist on the Cranberry bill and admittedly had reservations when the county first requested the compensation amendment in the spring of 1982. Our concerns were that this unique request for payment in lieu of taxes would diminish the legislation's chances for congressional passage and signature by President Reagan. After a great deal of thought and some gentle persuasion on the part of Senators Byrd and Randolph, the Conservancy Board of Directors gave the compensation amendment their full support, not simply because it was politically expedient but because it was the fair decision to make when considering the very pressing financial needs of Pocahontas County.

The Cranberry Wilderness Act was unique in many respects. It created the largest eastern wilderness area; it was the first wilderness bill which ever required a federal expenditure to purchase minerals (in this case approximately $15 million), and by the accounts of many Washington conservation lobbyists and Congressmen, it was the most difficult wilderness bill ever passed. In addition to these noteworthy features, the Cranberry bill was the first federal legislation to ever compensate local government for tax revenue loss resulting from the federal acquisition of private property. The Conservancy is proud of the supporting role it had in assisting Pocahontas County and wishes the best to the Pocahontas County Commission and the Pocahontas County Board of Education in their benefit and use of the $2 million Cranberry Wilderness Fund.

Letters!!

A Rose is a Rose is a Problem

Editor:

Over two year's ago the West Virginia Legislature passed a bill to eradicate multi-flora rose. To this date, nothing has been done on the job.

Is it not about time for the Department of Agriculture and the Department of Natural Resources to get a start on the job? After all, they were the ones who were responsible for the planting of this "Noxious Weed" in the first place.

"Oh! Be sure to plant this beautiful flower. It makes a wonderful hedge, and is also good as a fence, as nothing will go through it." This was their doctrine. But they did not explain how it would spread over our fields and through the woods.

Charles Carlson
Box 131
Charleston, WV 25301

(Editor's Note: The **Voice** needs your voices too! Send your letters with your ideas about issues, the organization, and the newsletter. If we get too many, we'll choose on the basis of range of views, relevance to the Conservancy, and balance of issues. Right now, we're not getting enough. Lick your pen and have at it!)

HYDROPOWER: THE PARADO

Analysis: A Series on the Issues

Hydroelectric power has never provided more than a small part of the electricity consumed in the United States. But since the energy crisis of the early seventies, the appeal of this renewable resource in a world of declining fossil fuel reserves is again increasing.

We tend to think of water power as clean, pollution-free energy. It produces no sulfur dioxide, no nitrous oxides, no excess heat and no particulates to clog the air. In the face of that, arguments for full development of hydro resources seem entirely reasonable, at least until a development project threatens a river or a piece of land we hold dear.

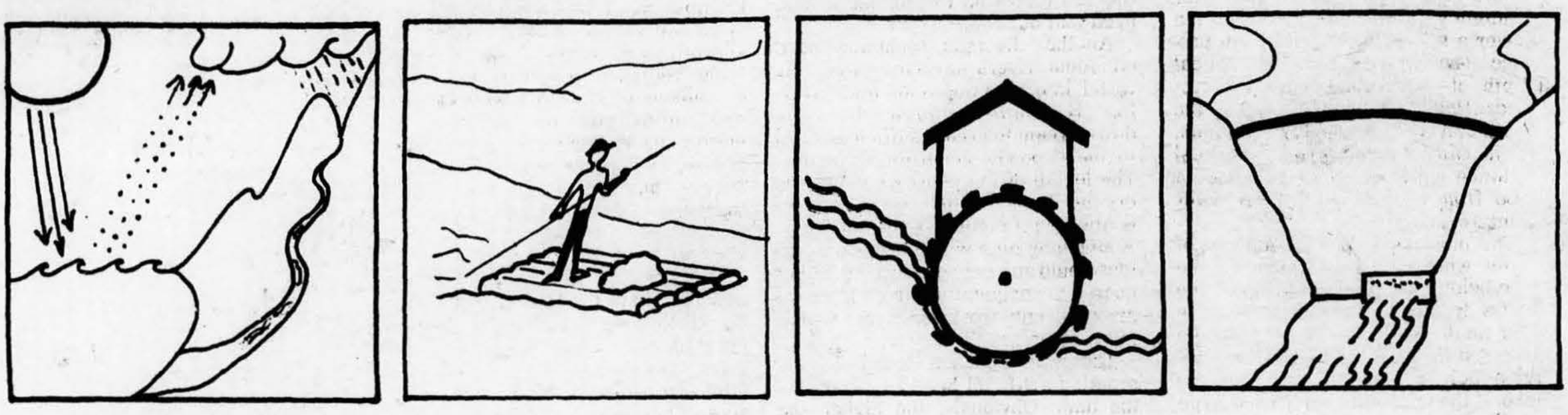
Hydropower is "clean" energy, but even clean energy can't be harnessed without cost. Plans for development of the water resources of West Virginia and the rest of the Appalachians for hydroelectric generation have brought controversy in the past. New plans will bring controversy in the future. To face those controversies intelligently, we must understand the processes, the benefits and the dangers of development. To address the issues successfully, we must understand the procedures, laws and agencies which control the decisions about which projects are built and which aren't.

This series will analyze hydropower from a lay perspective. To those who have worked on hydropower issues before, much of it will review what you already know. For the uninitiated, the series will try to make a complex field at least comprehensible. But we hope to provide all readers with new facts, new insights, and new perspectives on the industry.

Hydropower issues are changing in the eighties. The megaprojects which commanded attention in the sixties and seventies stand in the shadows today as the action shifts to small-scale hydropower. The shift alters the balance, and requires us to rethink our ideas and our assumptions.

We hope this series will help **Voice** readers in that process. Once we've reviewed the fundamentals of hydropower, we'll analyze the need, the potential resources in West Virginia, the environmental impacts of development, the changing scene in license applications, and the ins and outs of the licensing process.

If any of our readers are experts, or want to join the research for later parts of the series, write the **Voice** now. We're always looking for "clean" energy.



History: Harnassing the Wild Horses

The first use of the power of water happened somewhere in the dark of pre-history. We can wonder what flash of recognition came to primitive man with the discovery of water's bouyancy, of its great power to move and carry objects which humans could not budge. We can imagine the awe of the primitive in the face of high waterfalls and raging floods because we share those feelings today. Moving water remains wondrous, and will always remain so. Just as the rivers draw us today, our ancestors must have been drawn. Since the beginning of time, humans have wanted to ride these wild horses. Some have dreamed of taming them. Some have succeeded.

The power of water is really the power of the sun locked up in clever disguise. As with all energy we use, water power is produced as part of a cycle of energy transformations. The light waves are transformed to heat as they penetrate the ever thickening atmosphere. As the energy is absorbed by the molecules of water which ride the surfaces of oceans and hold to their kind in soil and inside plants, the molecules vibrate harder and harder until they break away.

The energy spent in pulling the molecule loose from its terrestrial bond is stored there for the time. As it rises and drifts and eventually condenses once again from vapor into the droplets of the cloud, the energy is carried along as potential energy, stored against the moment when the warm currents turn cold and gravity pulls the water back to earth.

Motion involves the release of energy. As the rain falls, as excess water moves into the streams and pours ever downward, energy is being released. Capturing that power has long fascinated the human race.

Floating logs probably inspired the first boats and taught our species the lesson of effortless movement, but thousands of years passed before we learned to transfer that power to other uses through the water wheel. By the time of the ancient Greeks and Egyptians, water wheels were grinding grain and irrigating crops, but no record shows when they first appeared. Although human ingenuity had put the energy to work in mills and pumps, the problem of transferring this energy over distances had not been solved. Everything had to be done beside the water.

Transmission of the power of water except through channels or canals had to wait for the era of electricity. In 1832, the French engineer Benoit Fourneyron developed the first fully successful enclosed water turbine. Coming almost simultaneously with Faraday's discovery of the principles of generating electricity by rotating a coil of copper wire between magnets, the potential of producing electric power from water reached the threshhold of being unleashed.

Fifty years later the first hydroelectric plant in America went to work on the Fox River in Appleton, Wisconsin. With only 10 feet of head, the small plant produced 25 kilowatts, enough to power two paper mills and light one residence. Although this 1882 success sparked more small plants across the country, the nation still had 50 years to wait before the first giant dam would begin to rise.

The groundwork for hydropower development was laid in 1906 when the federal government first sold electricity from Bureau of Reclamation projects. The interior secretary was authorized to make sales when electricity wasn't needed to pump irrigation water.

Three years later, the government directed the Army Corps of Engineers to "consider electricity production as a benefit when considering navigation projects."[1]

In 1920, the Federal Power Commission was set up to oversee development of hydropower projects. In the same decade, hydropower became "a rationale in itself for Corps of Engineers project."[2]

The attraction of huge projects must have been overwhelming to Congress as the Depression loomed. Congress authorized the Boulder Canyon Project in 1928, originally conceived for flood and drought control. But the obviously huge potential for hydroelectric power captured behind the proposed Hoover Dam impressed the Congress. Happy to learn the project might pay for itself through the sale of power, they bought the idea.

With its high head—the dam is 725 feet high—and huge storage capacity, the project had the potential to produce over 1,300 megawatts of electricity. Although the capital cost was high—$175 million for the dam alone—the multiple benefits of flood control, irrigation, jobs for a depressed economy and vast quantities of electric power made the investment very appealing.

In a flurry of optimism about hydropower, and a flurry of Depression-era bureaucracy building, the government established the Tennessee Valley Authority in 1933 and soon after, the Booneville Power Administration. The massive Grand Coulee Dam began to rise in the northwest; other projects dotted the country.

But the growth of these huge projects was headed off by World War II, and after the war the abundant and low-cost fossil fuel steam-electric plants belied arguments for a further large public investment in hydropower.

With rapid electrification and industrial expansion, the growth of demand for electric power seemed by the sixties to be unlimited. The growth of hydroelectric capacity in the United States reached its peak during that decade. Between 1960 and 1972, the number of large plants

K OF CLEAN ENERGY: PART I

producing over 100 megawatts climbed from 85 to 129. Of the 1,511 hydro plants on line in 1972, these few large facilities represented 72.3 percent of total developed hydroelectric capacity.

Power companies also recognized the compatibility of hydropower with coal-fired plants. The rapid start-up and shut-down possible with hydroelectric generation would let companies use hydropower for peaking and lower demand on baseload plants.

The outgrowth of this kind of thinking led to the idea of pumped storage projects, where coal-fired baseload plants ran pumps during off-peak hours to lift water from a lower reservoir to an upper reservoir. During peak hours, the water would be released through the penstocks from the upper reservoir to power turbines located at the lower reservoir.

By 1978, over 10,000 megawatts of capacity had been developed in pumped storage projects, and three times that much capacity in new projects was on the drawing board. Although the process actually consumed half again as much energy as it produced, power companies still saw pumped storage as an important part of overall plans.

Federal agencies such as the Federal Power Commission and the Corps of Engineers along with private power companies entered the seventies with visions of ever-continuing and rapid expansion of all sources of power. Hydropower was very much on their minds and in their projections for the future of energy development in the United States.

They planned to harness all of the wildest and best of the wild horses.

[1] **Energy Policy**, 2nd Edition (Washington: Congressional Quarterly, Inc., 1981, p. 114.
[2] Ibid.

Fundamentals: How Hydropower Works

Two factors (other than generator efficiency) determine how much power a hydroelectric plant can produce. The first is **head**, the vertical depth of the water above the turbines. Head can be a function of the depth of a lake created behind a dam, or it can depend on the vertical distance water is carried through a tube from a high point to a lower point. (Fig. A)

The other factor is the amount of water which can be released. If the lake behind the dam is small and the inflow from upstream of the lake is also small, very little water could be released through the turbines to produce power, short of draining the lake. If the impoundment is very large or the upstream input large, much more power can be produced.

Stated simply, the amount of head multiplied times the amount of water flow and adjusted for generator efficiency will determine how much electricity a project can produce at a given time.

Rivers with a small flow can only be used efficiently for hydropower if a large head is naturally available or can be artificially constructed.

If a river flows over a 100 foot waterfall, the water could be caught above the falls and channeled into a tube or penstock, then carried down the 100 foot drop to produce a hundred foot of head.

Another diversion technique used on some rivers involves capturing water in a tube upstream and carrying it along enough distance downstream to create sufficient head to make power generation feasible. The length of the penstock is not the crucial factor, though, because head is always a function of vertical drop. A mile long tube which drops only 10 feet would still only produce 10 feet of head. Consequently, this kind of diversion only works on rivers with a fairly steep gradient.

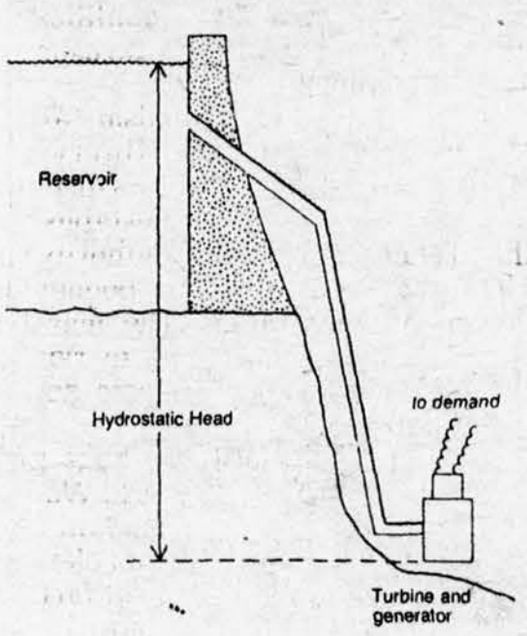
The most common technique for creating artificial head is, of course, the dam. Obviously, the higher the dam the more head, and the larger and deeper the reservoir created behind it. High dams require mountainous terrain, since both dam and reservoir depend on the natural walls of surrounding hills.

The quantity of water available depends on the river and reservoir characteristics, but the amount of flow also depends on the size of the penstocks which carry water to the turbines. Water flow is measured in cubic feet per second (cfs). If water flows into a reservoir at the rate of 2000 cfs and is released through the penstocks at the dam at 3000 cfs, the reservoir is being drawn down.

Since upstream flows are unpredictable and vary so much from season to season, dam planners prefer a large reservoir, measured in acre-feet, because the water level will be more stable and the drawdown less noticeable.

Hoover Dam creates a reservoir which holds a supply equal to two years of average river flow, nearly 30 million acre-feet (36.7 billion cubic meters). In dry periods, electricity production and irrigation from Hoover continue without interruption.

Smaller dams have to remain more subject to supply than to the demand for the water, so they are considered less reliable.



CONVENTIONAL HYDROELECTRIC POWER GENERATION

"Fig. A"

Electric power is measured in watts. In large scale production, the measurement may be expressed in kilowatts (kw), megawatts (mw), or gigawatts (gw), a convenience which allows us to dispose of a good many zeroes.

One gigawatt is one billion watts; a megawatt is a million watts; a kilowatt is a thousand watts. Some tables represent power as thousands or millions of kilowatts while others use thousands or millions of megawatts or gigawatts, so the interpreter is obliged to be careful to correlate tables using the same langauge. Information on hydropower seldom uses a unit smaller than the kilowatt.

The largest hydroelectric project now on line in the United States and the world is the Grand Coulee Dam on the Columbia River in Washington state. Grand Coulee's capacity, the total electricity it can produce at a given moment, is about 6,500 *megawatts. This figure could be ex*pressed as 6.5 gw, or 6.5 million kw. This dam will be dwarfed when the 12,500 mw dam on the border of Peru and Brazil begins to operate.

While these terms are used to express capacity, measurement of production requires a time factor. To measure production, the energy is multiplied by the hours, and may be expressed as kilowatt-hours (kwh), megawatt-hours (mwh) or gigawatt-hours (gwh). A plant which was producing exactly one gigawatt of energy at any given time would produce 10 gwh in 10 hours, 100 gwh in 100 hours, and so on, assuming the energy didn't vary.

Hydroelectric plants don't run at capacity constantly, so the real indicator of hydropower potential has to project energy production over a year or more. This figure, expressed as gwh or mwh, will take into account such factors as seasonal flows, downtime for repairs, and demand for the power. If a project is used only for peaking power during the day, only about a third of its total capacity would be realized.

Conventional dams (not pumped storage) are usually either "run-of-river" projects or "store-and-release" projects. Some are a hybrid of the two. Run-of-river projects come close to imitating the natural flow of the river, with a somewhat reduced flow during high runoff to help control downstream flooding, and a somewhat augmented flow during dry spells.

Store-and-release dams release water when it is needed for irrigation or power production, and hold water back at other times. Although some water is usually released at all times, the river below a store-and-release dam will all but dry up when the turbines are shut down. The store-and-release dam has a much greater impact on the environment of the river, as we will see later, but power producers see it as more efficient.

While these fundamentals of hydroelectric power are very simplified, they will be the essentail basis of analysis of the potential sources, the historical and projected demand for power, the methods of economic analysis of hydropower feasibility, and even the environmental impacts of proposed projects.

Next month, the **Voice** will examine *"Energy Supply and Demand: The* Force Behind Hydropower Development."

Sources:
Editorial Research Reports, **Energy Issues: New Directions and Goals** (Washington: Congressional Quarterly, Inc., 1982).

Energy Policy, 2nd Edition (Washington: Congressional Quarterly, Inc., 1981).

David J. Cuff and William J. Young, **The United States Energy Atlas** (New York: The Free Press, 1980)

"Small Scale Hydropower and the Environment: How Much Harm?" Friends of the Earth, (Photocopied), 1983.

Rock Climbing Banned at Coopers Rock

Climbers from Pittsburgh call the action "unreasonable," but on April 24th, rock climbing and rappelling were banned in Coopers Rock State Forest.

The ban, imposed by the Department of Natural Resources on the request of the Forest Superintendent, came primarily because of the increase in serious accidents in the area. Codie Hudkins, assistant to the chief of the parks and recreation division, said four serious accidents occurred in 1983, double the rate in previous years. Two more happened in 1984 before the prohibition was imposed.

Hudkins said the area has grown in popularity to the point where the staff can't control the climbing. Fearing legal liability and lacking funds to increase staff, the department decided on a complete ban.

Another factor in the decision, DNR officials say, was the threat to a rare snail living on patches of sandstone below the summit. The three-toothed flat spiraled land snail apparently lives nowhere else in America. Activity on the rock face may threaten its habitat.

Joe Hoechner, a climber from Monroeville, Pennsylvania, called the ban a "bad precedent which could be applied to other outdoor areas."

Sayre Rodman, WVHC Director and member of the Pittsburgh Climbers agrees. "Serious accidents *and several deaths* have occurred at Seneca Rocks, but there's been no thought of closing it that I know of." Rodman noted the closure "is analogous to closing a whitewater river because a few people tried to do class V rapids in inner tubes and drowned."

Both climbers and DNR officials alike place some of the blame on inexperienced people trying new skills in a difficult area without adequate safety precautions or equipment. Rodman goes even farther in that view. "It's my understanding the accident victims have all been hikers who got in over their heads or rappellers who are out for the thrills of sliding down ropes. Climbing is an entirely different sport," he said. He described the goals of rock climbing enthusiasts as "acquiring technical skills in ascending rocks."

Although a requirement for certification could assure only experienced, well-trained climbers would get on the rocks, Rodman sees it as a question of the rights of people to enjoy themselves. "In place after place across the country the government has decided that posting warnings is reasonable government policy, but that it's not a ranger's role to make decisions about a person's skills.

A June 3 article in **The Pittsburgh Press** quoted The Explorers Club of Pittsburgh's climbing coordinator, Bruce McClellan. "Coopers is just too valuable of an area to us to lose," he said.

When asked whether the climber's recreation and the rare snail could both be preserved by designating a specific area for climbing, DNR's Hudkins said, "It's something to consider. But right now there just aren't funds to hire someone to monitor the situation."

Coopers Rock, only 60 miles from Pittsburgh, draws climbers with its challenging rock faces and spectacular scenery.

News Briefs

Driller Fined

Alamco Oil and Gas Drilling Co. was fined $12,500 in April on five counts of pollution as a result of drilling operations on the headwaters of the Middle Fork of the Tygart River in Upshur County. The firm has paid $35,000 in fines this year.

The charges included failure to construct and maintain drilling pits, failure to construct proper access roads, failure to maintain a drilling pit, and contributing to conditions not allowed in state waters.

Water Pollution Regs Tougher

A settlement between the EPA and three groups will establish tough regulations for the control of pollution from coal mines and coal preparation plants.

Old rules promulgated in 1982 set less stringent limits on discharges during rainfall. Mountain Stream Monitors, the state of Pennsylvania, and the National Coal Association sued the agency as a result of the rules. The newly proposed regulations will be more stringent during rainfall.

The agreement also modifies EPA's definition of new source coal mines and revises new source performance standards.

Sutton Hydro License Application Revised

Noah Corporation's application for a hydroelectric license for Sutton Dam has been revised and resubmitted to FERC. The changes, which call for "run of river" releases (governed by the U.S. Army Corps of Engineers) and use of two instead of three existing outlets, reduce the potential generating capacity from about 13 megawatts per hour to eight megawatts.

DNR had denied water quality certification to the project for the original plan because of anticipated adverse effects on the river downstream. The town of Gassaway is the official project applicant.

APCO Acid Rain Inserts Upheld

A year-old complaint filed with the Public Service Commission against APCO's practice of distributing information about acid rain was dismissed June 21. Four groups, including the Coalition of American Electric Consumers, the National Wildlife Federation, the W.Va. Wildlife Federation and WV-CAG filed the complaint after the utility used its billing process to send out leaflets containing what the groups called "one-sided" information.

Citing the conclusion that the stockholders rather than the ratepayers had paid for the advertisement, PSC claimed it had no jurisdiction in the matter. "Although we look upon such practices with disfavor, the law was not designed to give this commission the authority to regulate such activities, for the billing insert issue is not closely associated with practices involving rates and services," the commission said.

WV-CAG Executive Director David Grubb disagreed, since the PSC makes rulings affecting rates and the acid rain controversy affects rain. The groups plan to appeal.

Volunteers to Work on Forest Trails

About 20 Sierra Club volunteers will join U.S. Forest Service workers in a two-week trail improvement project in the Laurel Fork Wilderness of the Monongahela National Forest.

Using only hand tools such as axes, crosscut saws and shovels, the workers will hike in and camp using no-trace techniques to preform their work in remote areas of the wilderness.

The Forest Service will provide tools, instruction and supervision for the project.

202 Hazardous Waste Dumps Identified

The locations of 202 "potentially hazardous waste dumps were pinpointed by DNR officials in mid-June. The list, published in the June 24 **Charleston Sunday Gazette-Mail**, named the sites in a county-by-county list.

The top ten counties were Kanawha (44), Brooke (18), Putnam and Wood (12), Hancock (11), Mason (9), Marion (8), Cabell and Monongalia (6) and Hampshire (5). Other counties listed had four or fewer sites, and nine counties did not appear on the list.

The highest concentrations of sites surrounded chemical producing areas in the Kanawha Valley at Nitro, St. Albans, South Charleston, Charleston and Belle.

West Virginia ranks ninth among the ten states which produce two-thirds of all hazardous wastes in the United States. Forty of the sites here were created by chemical companies; 85 are county landfills or sanitation dumps. Another 60 sites are associated with other industries.

Hydro Relicensing Process Presents a Choice

The 'Drys' is a 5.3-mile section of the New River between Hawks Nest Dam and the Hawks Nest power plant. The power plant is located about two miles above Gauley Bridge, the confluence of the New River and Gauley River to form the Kanawha. The Hawks Nest hydropower development consists of the dam, a 16,000-foot water diversion tunnel and a powerhouse. It was constructed in the 1930's to provide hydroelectric power for the ferroalloy smelting plant in Alloy, West Virginia. The hydro and ferroalloy plants are now owned by Elkem Metals, which also owns another hydro plant at Kanawha Falls, and a coal fired power plant is used to supplement electric power needs when hydroelectric generation is low.

The Hawks Nest hydro plant is capable of producing about 100,000 kw of electricity when flows in the New River are 10,000 cubic feet per second (cfs) or greater. The diversion tunnel, an underground conduit, passes water from the impoundment created by Hawks Nest Dam to the downstream hydro station, thereby diverting flows out of the New River.

When river flows are less than 10,000 cfs and the ferroalloy plant is operating, only 25 cfs is released into the 5.3-mile reach of the river. Burrell stated it best in **Wild Water West Virginia** when he said, "The tunnel has a voracious thirst so the river is empty until the New's flow exceeds 10,000 cfs. . . ." A 25 cfs minimum flow is released to keep the 'Drys' from totally drying up and for the benefit of aquatic life.

The average flow at Hawks Nest Dam is over 9,000 cfs. The lowest mean monthly flow, September's, is over 3,500 cfs. The September average is 140 times greater than the flow released into the 'Drys.' During the winter and spring periods when flows exceed the 10,000 cfs capacity of the power plant, excess flows are dumped into the 'Drys.' This occurs about 30 percent of the time.

The 7Q10 flow, the lowest average flow for seven consecutive days which occurs once in a 10-year period, is about 1,200 cfs. This flow is generally considered the critical low flow for maintenance of water quality and aquatic life.

The 25 cfs low flow release has caused a significant reduction in aquatic life in the 'Drys.' While the river channel does not totally dry up, many areas of the channel bottom are dry and no longer serve as aquatic habitat. Several deep pools are maintained in the lower half of the reach but riffles are basically dry. Growth of riparian vegetation is hampered by regular dewatering of the shorelines. Streambank cover for furbearers and fish is limited to habitat adjacent to deep pools.

Populations of benthic (bottom-dwelling) organisms and fish are further reduced by the sudden increases in velocity when river flows exceed the power plant capacity and flows are dumped through the dam. Any aquatic life that has adjusted to low, slow-moving currents is then subjected to high velocity and flow increases and is flushed downstream during these periods. Plants and animals common to slow moving water cannot establish good populations due to the frequent, large flow increases; species common to high flow and velocity situations do not establish good populations because low, slow-moving flows occur during most of the year.

Rapid decreaases of flow also move fish downstream. Along with a reduction in total available habitat, competition for space and loss of shelter and food forces fish to move downriver.

The New River and upper Kanawha are known to support excellent warmwater fisheries. The New River is often considered to be the best warmwater river in the state, supporting excellent populations of smallmouth bass and channel catfish. Largemouth bass, flathead catfish, and walleye are also common.

The 5.3-miles of the 'Drys' represents about eight percent of the New River in West Virginia (excluding flat water created by Bluestone Lake and Hawks Nest Dam), a significant amount of West Virginia's finest warmwater river.

Elkem Metals is presently seeking a new license to operate the Hawks Nest hydro plant from the Federal Energy Regulatory Commission (FERC). The company's proposed license would permit them to continue to discharge only 25 cfs into the 'Drys,' possibly for 50 years, until 2036. Relicensing under these terms would perpetuate habitat and water quality problems and prevent development of recreational uses of the area.

FERC's relicensing procedures provide the opportunity for the public, as well as Federal and State agencies, to comment on the project with a view to protecting environmental resources. State water quality certification is required from the Department of Natural Resources (DNR) at this time.

Comments can be sent to the Director of the West Virginia DNR and the Secretary of the FERC. Write: Mr. Willis Hertig, Director, West Virginia Department of Natural Resources, 1800 Washington Street, East, Charleston, WV 25305; Mr. Kenneth F. Plumb, Secretary, Federal Energy Regulatory Commission, 825 N. Capitol Street, N.E., Washington, D.C. 20426.

.....good friends

Guardians of West Virginia Waters
by Milton Zelermyer

In the mid-1970's, a few Braxton County residents concerned about environmental impacts of large-scale coal development in central West Virginia formed a grassroots group called Braxton Environmental Action Programs (BEAP). BEAP's early efforts in presenting comments on impending permits, requesting area wide environmental assessments, and organizing public meetings were inspired and spearheaded by Rick Webb. Save Our Mountain loaned BEAP some equipment, and they were on their way to becoming water quality monitors.

With the help of West Virginia CAG and the Baltimore Environmental Center, Rick Webb applied for and received an EPA grant. This grant helped establish W.Va. Mountain Stream Monitors as a pilot project in 1978, demonstrating that lay members of the public could acquire expertise in water sampling and testing techniques. Monitoring stations were set up at various watershed—Birch River, Elk River and Little Kanawha River.

At first, MSM volunteers tested water chemistry, including pH, conductivity, iron, manganese and other metals. As they gained experience and greater sophistication, MSM studied stream life and did benthic monitoring.

MSM promotes public education on water quality issues through workshops on water monitoring and the publication of **Confluence**, a water resources journal for West Virginia. The group has conducted workshops in Lincoln, Monongalia, Randolph, Upshur, Preston and Summers counties. A slide show on benthic studies was presented to the WVHC at the Winter 1983 meeting. With MSM's assistance Randolph County Schools has adopted a curriculum unit on stream life.

The organization, now 70 members, adopted by-laws and established a board of directors in 1982. MSM has received additional funding from the West Virginia Highlands Conservancy and the Appalachian Institute, as well as from membership dues and individual contributions.

For more information, write: WV MSM, Inc., Box 170, Morgantown WV 26505.

Coming Up...

WVHC SUMMER MEETING
—July 28-29
—Nicholas County Memorial Park, Summersville
—Saturday tour of the Gauley River, evening squaredance/party; Sunday board meeting starting at 9 a.m.

MORE HIKES
—July 14-15, Otter Creek
—WV Group/Sierra Club backpack or dayhike through Otter Creek hardwood forest
—Contact Pat Stanley (485-8293)

—July 21, Kanawha State Forest
—Dayhike for nature study and photography
—Contact Charles Carlson (343-2056) or Pat Stanley (485-8293)

—July 21, Brush Creek, Mercer County
—WV Chapter/The Nature Conservancy sponsors a dayhike to one of the state's best stands of Canadian yew.
—Contact Rodney Bartgis (636-9270 evenings, 636-1767 day).

—August 18-19, Spruce Knob Lake and Blister Swamp
—WV Chapter/The Nature Conservancy trip—"leisurely."
—Meet Saturday 6:30 p.m. at Spruce Knob Lake parking lot. Same place Sunday at 10 a.m. for swamp trip.

Join the Conservancy

Books & Info

From a childhood dream of watching wildlife to field studies and conservation projects in Guatemala, Anegada, Panama, the Dominican Republic and other tropical areas, Anne LaBastille traveled a fascinating road toward her mature status as an award winning conservationist and wildlife ecologist.

In her second book, **Assignment: Wildlife**, (E.P. Dutton, 1980), she retraces several vital stages of this passage with both the scientist's thrill of discovery and the storyteller's flair for suspense.

Initially branded "the crazy bird lady" on her first independent project at Lake Atitlan, Guatemala, LaBastille gradually earned the respect of locals through diligence, concern and tact. What began as merely a scientific study of the giant pied-billed grebe, a flightless species found only on Lake Atitlan, soon grew into a full-fledged conservation project. When she found only 80 birds remaining of the 200-plus counted by ornithologists fifty years before, she recognized the imminence of extinction. Saving the species depended on identifying the cause of decline, winning local support and establishing a program for protection.

The search for the culprit in the grebe's decline is easily the most compelling section of the book. LaBastille *hears the blame laid to hunting, reed* cutting and even bird suicide, but her patient research ultimately leads to a surprising conclusion.

Once the trouble comes clear, her efforts to save the bird are sprinkled with the inevitable setbacks. The obstacles include such surprises as local witchcraft and the chance mistake of ordering game warden's uniforms the same color as those worn by guerrillas in the nation.

The beauty of LaBastille's work comes through her modest and objective description of events. If she didn't understand instinctively, she learned quickly the delicate balance between local and national beliefs and interests and conservation goals. She accepted the challenge of building local support through education and national pride and developing a strategy consistent with the native Indian culture and the minimal resources available.

In later chapters, the tested wildlife ecologist puts her skills to work to protect the fabulous quetzal, to help establish a national park on Volcano Baru in Panama, to study the potential effects of development on a nearly pristine Caribbean island, and to design a national park for the Dominican Republic. While she saw some efforts fail, she witnessed various levels of success with others.

The book concludes with the reflections of a mature ecologist after a three-month journey down the Amazon, the mixture of discouragement and hope arising from the broad scale destruction of natural habitat set against the every-growing strength of the conservation movement.

She writes, "Until a few years ago, environmental problems tended to be localized and regionalized. Thus, they could be set right fairly easily. Today, however, we are faced with such sweeping exploitation and contamination that we can be affected by events taking place thousands of miles away. Just three examples will indicate the scope of our environmental problems: deforestation, decertification, and acid precipitation."

Dr. Bastille states unequivocally that "any ecosystem, no matter how rich and resilient, can be pushed to *the point of no return.*" But she bases her hope for the future on movements to create and sustain national parks, projects of the World Wildlife Fund and other groups, and "the support system among conservationists which nurtures and inspires us."

The book is well-written through and through, never dull, even spiced with the small personal asides which bring the writer near. But most importantly, the chronicle of the patient, tactful work needed for conservation work to succeed teaches vital lessons as it inspires us with the need to presevere.

Assignment: Wildlife may be out of print, but it's good enough to go to the trouble of requesting through inter-library loan. It deserves to be reprinted and made required reading for MBA's, mega-developers and government officials. Barring that, it's a book you will enjoy.

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Funds for Greenbrier River Land In

River conservation funding for Fiscal Year 1985 got off to a good start June 19, when a House Subcommittee included in the Interior Appropriations bill approximately $1.2 million for National Park Service technical assistance programs and $9 million for land acquisition on 11 rivers, including nine in the National Wild and Scenic Rivers System. Representative Sidney Yates' subcommittee returned funding to last year's levels, resisting the Administration's request for 75 percent cuts in these programs.

Included in the subcommittee's Land Acquisition allocation is $200,000 for the purchase of a section of abandoned railroad bed on the upper Greenbrier River. The 23-mile stretch lies along the West Fork of the river and represents a potential extension of the Greenbrier Trail. Bordered on both sides by the Monongahela National Forest, the railroad right-of-way represents the largest tract of privately owned land on the West Fork. Some fear the land might be sold in small tracts if it is not purchased for the National Forest. The area is now virtually uninhabited.

Congressman Harley O. Staggers, Jr., plans to hold a public meeting on the purchase in Greenbrier County during July or August. According to reports, Staggers will support the legislation if he hears from people in his district who favor the purchase.

The Land Acquisition allocation, although short of ARCC's request for $16.2 million, gives agencies a good bit more Land and Water Conservation Fund monies to work with than the Administration's proposed $1.5 million.

The "River Conservation Technical Assistance" program, with ARCC Conservation Director Chris Brown singled out for its cost-effectiveness and stimulation of local activity, provides Park Service assistance to states and local organizations developing river conservation strategies. It appears under the Department of Interior's "Natural Programs" budget. The subcommittee asked for a $1.024 million "add-on," bringing the total to $1.849 million for Natural Programs in FY'85. This represents a 9 percent increase over last year's figure for Natural Programs as a whole and 5 percent specifically.

Brown, who testified before the subcommittee in February on the rivers budget, was pleased with the results of the markup. Brown said that "the subcommittee recognized the merits of these rivers and we're glad to see a few dollars committed to their preservation. I am disappointed, however, not to see funds included for the Obed (Wild and Scenic), and at the holding of last year's levels in the state and local assistance program. This means that certain worthy projects will not be able to proceed."

Particularly supportive members of the Interior Appropriations Subcommittee were Chairman Yates, and members Les AuCoin, Silvio Conte, Norman Dicks, and William Ratchford.

House passage of the Appropriations bill is expected in late July, with Senate mark-up and action to follow in August. Historically, the Senate has dramatically trimmed the House-passed levels.

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