PART TEN

FUNDING STRATEGIES AND MEASURES OF COST-EFFECTIVENESS

"THE PATCHWORK QUILT" CREATIVE STRATEGIES FOR RELOCATION, ACQUISITION, AND BUY-OUT

Edward A. Thomas and Barbara Yagerman
Federal Emergency Management Agency

---

synergism (sin'er jiz'em) **n.** [ModL synergismus, synergos, working together, see SYNERGY]**1** the simultaneous action of several agencies which, *together*, have a greater total effect than the sum of their individual effects.

—*Webster's New World Dictionary*, Third College Edition

In American Indian culture the term *Nania* means *"All together."* This is a powerful concept when looking for creative common sense strategies to help individuals and communities cope with repeated flooding. For that reason, Nania was the name of the 18th annual Association of State Floodplain Managers conference, held this year in Oklahoma.

Increasingly, individuals—residents, business owners, community leaders, and taxpayers—are becoming fed up with the hardship and costs associated with repeatedly rebuilding structures in areas that flood year after year. People living in flood hazard areas know only too well the high costs and emotional traumas associated with rebuilding, only to face another devastating flood.

The costs of rebuilding from repeated flooding go well beyond the repair of individual structures. There are costs to local governments—responding to crisis situations and repairing roads, bridges, and infrastructure. There are also costs to volunteer agencies, private organizations, and insurance companies and their premium payers.

Americans are generous in times of disaster. Time and again we see outpourings of support and donations to people hit by catastrophe. Communities come together and people help their neighbors. Despite this empathy for the plight of victims, the question is often raised: Why must taxpayers' money subsidize people who live along coastal or river areas that flood again and again and again?

As a government, we do not dictate where people can live, own property, or operate their businesses. We can, however, use sound zoning regulations and floodplain management programs to help ensure that people who remain in flood-hazard areas follow guidelines that minimize future losses.

However, nationwide we are finding that people are willing to move out of the floodplain. Wherever people are subject to repeated, devastating floods—from Aroostook County in Maine, to the Massachusetts coast, to

communities on the Mississippi, Missouri, and Platte Rivers—people are clamoring to find ways to relocate away from their unfortunate situations.

Accomplishing this objective is not simple. No single agency or program exists that effectively addresses all the diverse needs in areas impacted by repeated floods. But by Nania—working all together—creative strategies can be crafted for individuals and communities and, thus, turn vision into reality.

We must all work together to bring about a successful relocation, acquisition, or buy-out program for a neighborhood or even an entire community. We must utilize what can be called a patchwork quilt approach. This concept is based on the American idea that scraps of "this and that" can be turned into a useful, warm, and very valuable object by one or more persons who possesses a vision of the final product.

This is not an easy or rapid process: it requires constant attention to what we refer to as the "10 Ps":

1. **Posterity.** We hold the earth in trust for future generations. We must think long term and broadly, finding creative solutions. Just because something has "never been done that way before" does not mean it will not work now.

2. **People.** Put people first—*all people,* including victims, public officials (who may also be victims of the disaster), taxpayers, and future generations.

3. **Patchwork.** No single program exists to meet all the needs of the community or each individual. We need to take a bit of this and that.

4. **Persistence.** Never give up. Keep talking. Keep negotiating. Keep searching for the right answers and the right programs to meet specific challenges.

5. **Problems.** Keep focusing on problems. Synergy is important. Bring resources together. Communicate. Focus. How do allies, partners, and skeptics view the problem? How can differences be resolved and critical needs met?

6. **Prudence.** Focus efforts on achievable goals. Everyone's time is limited. Do not squander time on roadblocks. Move on and come back later.

7. **Personal Decisions.** Following a flood, people must make critical decisions about their lives, their families, and their futures. Remember

that this is a democracy and their decisions must be made within the framework of laws and regulations. They will probably require much help and support, as well as crisis counseling, which may be vital.

8. **Pro-Active.** Take initiative. Seek help. Expand your staff. Take advantage of the limited window of opportunity to create, fund, and complete the program.

9. **Patience.** This is a difficult time for everyone—victims, community leaders, and people assisting with the recovery. We need patience. We need to maintain calm. Help is available for everyone.

10. **Plain Common Sense.** If we can describe our programs in a straightforward way, the concepts should "sound right." They should sound like the logical solutions—the "common sense" things to do.

Creating the "Patchwork Quilt"

The analogy of a "patchwork quilt" is useful in clarifying the process for communities seeking viable, common sense solutions to complex problems. Communities need to know where to start and how to proceed. Assessing needs, accessing help, and identifying funding sources requires creativity, vision, leadership, and time.

The Quilter: Community Leadership with Vision

As the community picks up the pieces after a disaster and begins to rebuild, there is a window of opportunity. It is a time to fashion a new vision of the future, where people are safe from the fear of yet another flood. The quilter must show strong leadership to develop and implement a comprehensive plan that will leave a legacy for the future.

The Pattern: Getting Technical Assistance

Whether building a house, sewing a quilt, or relocating a community, a pattern or plan is needed. Imagine a quilter without a pattern. The quilter could get material and thread and sew the pieces together into a quilt, only to find that there is too much of one type of fabric and not enough of another. Colors and patterns may clash. Thus, time, energy, and money are wasted in trial and error.

The more efficient way is to create a design, map out a plan, and measure each piece. Some quilters have the time, energy, and experience to create their own designs. Others turn to proven patterns but choose their own

fabrics and colors. The same is true when fashioning a relocation project. Just as quilters look to patterns for guidance, community leaders can turn to a number of resources for the technical guidance needed to complete a complex project.

Technical assistance can be provided by a variety of resources: state hazard mitigation officers, the Federal Emergency Management Agency (FEMA), regional planning commissions, councils of government, and universities. FEMA in particular provides valuable assistance because of the agency's statutory role in coordinating the efforts of all federal agencies in disaster recovery.

The Fabric: The Array of Programs

Just as with any quilt, the ultimate appearance depends upon the fabric chosen. In the case of relocation, the fabrics are the various programs that provide funding and services that can make the quilter's vision a reality. In addition to seeking out expertise to formulate the pattern, the quilter can also look to resource guides such as the one developed following the Great Flood of '93 in Iowa.

Sewing it All Together: Taking Action

In the early days of this country, an old fashioned quilting bee would bring together community leaders; residents; business owners; and various government, private, and volunteer agencies. Likewise, a community can take action to create synergy for a better tomorrow.

Working All Together and How it All Works

Assembling the pieces, at first, can seem mind-boggling. It requires assessing the desires of each individual and business owner in an area, balancing their needs with broader community objectives, determining the best course and the right funding sources, and putting the process in motion.

Take a look at a hypothetical community—Anywhere, Rivertown, U.S.A.—to get a clearer picture. Picture an agricultural community of 4,000 people located along the majestic banks of the Great Fast River. The small-town government has only a few full-time employees or officials. Some of these officials wear many public hats and run their own businesses, too.

The people in the town are used to the floods, which occur every few years. Usually, basements get flooded, and when waters recede people dry out their furniture and start over. The last flood was different. Water levels were higher than ever. Houses that had only had basement flooding in the past were

soaked to the roof-line and remained under water for months. Some were washed from their foundations.

One neighborhood of 25 homes was hit particularly hard. The flood undermined many public roads and caused severe damage to private wells and septic systems. As the recovery process began, a few resources were already in place for the community:

- The town participates in the National Flood Insurance Program (NFIP) and FEMA representatives had already made community leaders aware of flood insurance program requirements for rebuilding substantially damaged homes.

- The state awarded a $150,000 Department of Housing and Urban Development (HUD) Community Development Block Grant (CDBG). Town officials planned to target $100,000 of this money to help the neighborhood in question. The remaining CDBG funds were used town-wide for other flood recovery activities. Town officials approached the regional planning agency to help develop a strategy to maximize use of these funds.

Working together with the regional planning agency, community leaders developed a "patchwork quilt" strategy. The result was the acquisition and demolition of the 25 hard-hit homes along the Great Fast River and their replacement with new, energy-efficient homes built away from the flood hazard zone. The new area was provided community water and sewer. The vacated area was replaced with a park, restored wetlands, and a centerpiece historic landmark. These efforts required the help of no less than 20 different agencies and programs.

Let's look at some of the patchwork (Figure 1).

Acquiring the Properties: Elements of a Buy-out

Funding sources may differ. Qualified homeowners with flood insurance can make use of the National Flood Insurance Program 1362 program funds. Those with no flood insurance may combine funds from the CDBG and the FEMA 404 Hazard Mitigation Grant programs. Most programs must be applied for separately, and each has its own guidelines. Some programs require matching funds from the community. Others provide specific requirements that must be followed after a property is acquired.

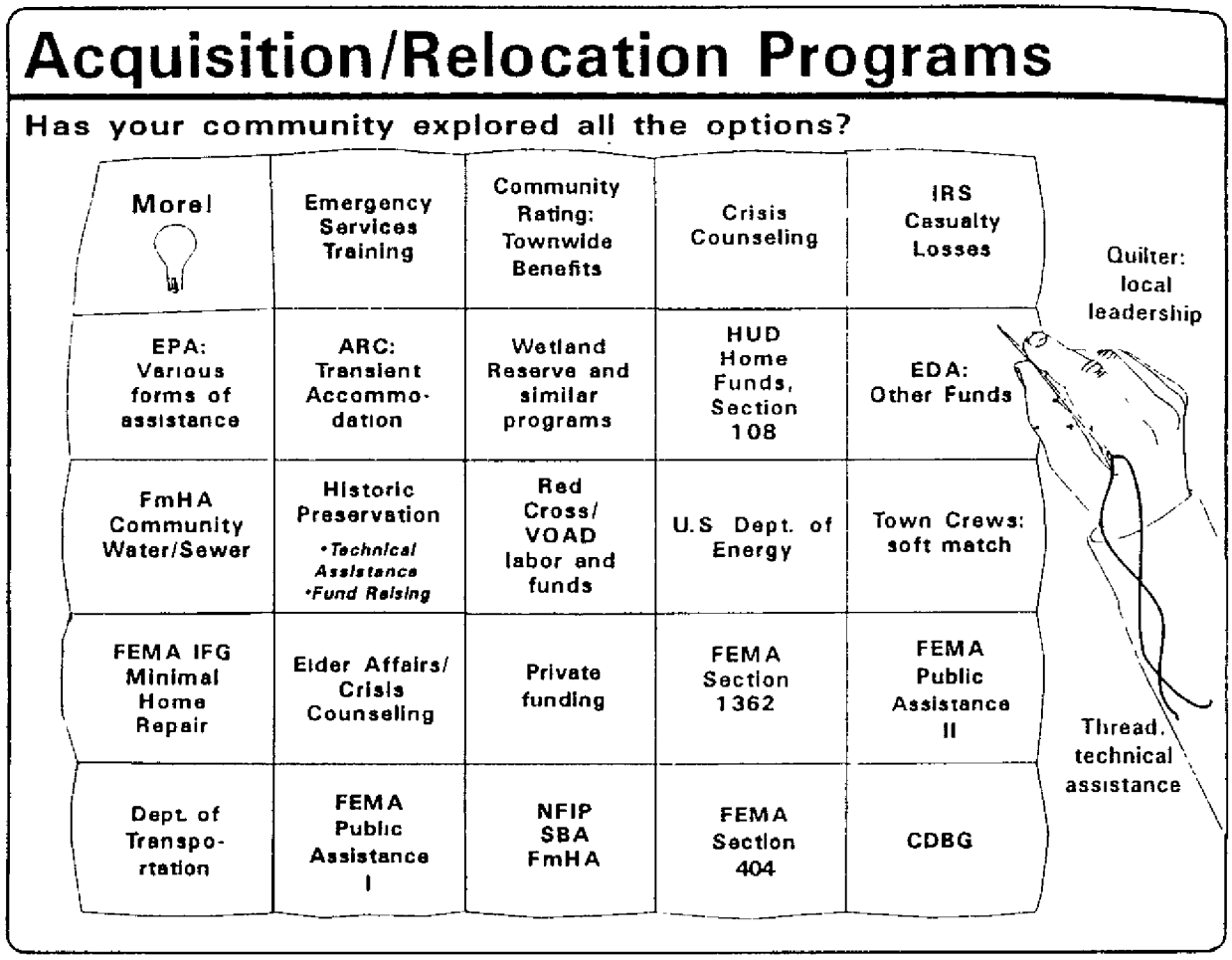

Figure 1. *The patchwork quilt.*

Funds to Individuals: How Do They Get Through the Process?

Once homeowners have decided to move and have found appropriate sources for acquisition expenses, they will be concerned about the costs of moving, buying a new home, and starting over.

Whether acquisition funds are provided by CDBG, Section 404 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, or the NFIP, individuals can expect to be paid pre-damage fair market value for a damaged property. Flood insurance proceeds and any federal funding provided for minimal repairs will be included in the final price.

In addition to funds for acquisition, homeowners may expect financial help from other sources. They may utilize low-interest disaster loans from the Small Business Administration. Grants from FEMA's Minimal Home Repair

Program or the state-administered Individual and Family Grant program may be called into play. Often, disaster survivors can get some cash relatively quickly by applying for refunds through the IRS disaster casualty loss program. If they still have needs, voluntary agencies like the Red Cross or the Mennonites can provide building materials, labor, or other types of assistance.

Affected individuals must be supported and counseled. Agencies such as the state or local department of elder affairs can help. In many cases, the state department of mental health will implement a crisis counseling program to address disaster survivors' needs—especially those who are facing major changes.

Funds to the Community: Putting it all Together

Buying up neighborhoods, building new subdivisions, and creating parks and open spaces requires funding and skills. We have talked about funding sources for acquiring properties. Yet, where do funds come from to administer aid, handle permitting, build new infrastructure, and preserve historic properties?

For starters, if there is a declaration for a public assistance disaster, FEMA funds can be used for building permit review, demolition, environmental review, and possibly some legal work related to demolition and rebuilding. Other agencies that may help include the U.S. Army Corps of Engineers, the Department of Energy, the Economic Development Agency, the Environmental Protection Agency, the Department of Housing and Urban Development, the Department of Transportation, and the National Trust for Historic Preservation.

Some funding sources require local and state matching funds. Town crews can be utilized to satisfy the requirements of these programs.

To round out the package, private resources are sometimes available. Local fund-raising efforts can support such things as business development and historic preservation.

Time, Patience and Synergy . . . A Whole Greater than the Sum of its Parts.

Time and patience are required in putting together the "patchwork quilt." The devastation may have taken many forms, and the recovery may take months or even years. But by working *all together*, balancing each individual's needs with the community's long-term objectives, Nania, *the synergism*, takes form.

COST-EFFECTIVENESS AND HAZARD MITIGATION: A MARRIAGE MADE IN THE U.S. CONGRESS[1]

Gary L. Sepulvado
Federal Emergency Management Agency

Introduction

The hands of cost-effectiveness and hazard mitigation were joined in the U.S. Congress with passage of the Stafford Act in 1988.[2] The bells did not ring, rice was not thrown, and only a small reception was held for the newly wed couple. Everyone was simply exhausted by the struggle of getting to the altar. It was a benign marriage for a couple of years. But marriage invites change, however imperceptible it may be. This paper is about change—the change in hazard management brought on by the marriage of cost-effectiveness and hazard mitigation, particularly the change in floodplain management[3].

Cost-effectiveness assessments (which some call the "CE" assessment, pronounced "see") and hazard mitigation are linked in profound ways; their rather quiet marriage belies the revolution that the union is causing in reducing hazard losses. The Federal Emergency Management Agency's (FEMA) Hazard Mitigation Grant Program is, for example, using CE assessments to look at the sufficiency of proposed mitigation grants, which include such things as disparate as historic structures and emergency power generators[4]. Another major program, the National Flood Insurance Program's "1362" acquisition program is beginning

---

[1]A wise person once said, "If you steal from one author, it's plagiarism; if you steal from many, it's research." I am indebted to many people who produced the information in this article, including Kenneth A. Goettel, Ph.D., Gerald L. Horner, Ph.D., Robert A. Olson, and Clifford Oliver and Ugo Morelli of FEMA. I am responsible, however, for any misrepresentations of their work that may appear here.

[2]Robert T. Stafford Disaster Relief and Emergency Assistance Act, P.L. 93-288, as amended by P.L. 100-707 (1988); 42 U.S.C. 5121 *et seq.*

[3]Following the seminal work in FEMA's earthquake program, the agency's mitigation grant program investigated the possibility of a method to determine the cost-effectiveness of hazard mitigation measures, whatever the hazard agent. A cross-fertilization occurred, producing a method applicable to any measure suggestive of mitigating future damages and losses.

[4]44 CFR 206, Subpart N, Hazard Mitigation Grant Program.

to use CE to round out analytically the potential for reduced flood damages[5]. Soon, state and local planning agencies, including emergency management agencies and offices, will use CE assessments to identify risks and concomitant mitigation measures.

Old Stuff with a New Flair

This paper sketches how an old economic model, cost-benefit analysis, is used with a new flair to avoid future disaster damages[6]. Basically, a CE assessment produces a benefit-cost ratio (BCR) that demonstrates whether the net present value of avoided future damage exceeds the cost of the mitigation measure in question (for example, the cost of elevating a home or buying out a homeowner). In other words, in a CE assessment, if the BCR is better than 1.0 for the location and type of structure under consideration, then, for the purposes of hazard mitigation, it makes economic sense to incur the cost today to avoid damages in the future. As shown below, this means that proponents of hazard mitigation have a new window for viewing the world of hazard management, whatever the hazard.

To reiterate and rephrase, a "cost-effective" mitigation measure has a net present value of future benefits (avoided damage and other losses) that exceeds the cost of the mitigation measure. This meaning differs from the conventional meaning used by economists and engineers. In conventional usage, cost-effective means the least expensive way to achieve a *pre-defined* objective (e.g., flood protection to a desired level). Thus, in conventional usage, a cost-effective measure may have benefits that are worth less than the cost. But this is not necessarily the case in reducing the impact of natural hazards.

The Variables

Considering the new approach to hazard mitigation that CE provides, some rather familiar economic and hydrologic variables are used to compute the BCR of flood mitigation measures[7]. It is the way these variables are put together

---

[5]44 CFR 77, Acquisition of Flood Damaged Structures.

[6]OMB Directive A-94.

[7]Economic and hydrologic assumptions are important since they are integral to the mathematical equations used in calculating the BCR. Unfortunately, because of the brevity of this paper, these assumptions must be inferred by the reader who is familiar with these sciences.

is a reduction in expected damage, expected benefit is defined as the sum of expected avoided damage. Five variables are used in the calculation: (1) scenario damage (for floods, the expected damage at a certain flood depth); (2) the annual probability of the hazard's occurrence or recurrence interval (10%, 2% and 1% floods, for example); (3) expected annual damage (the product of scenario damage and the annual probability); (4) the effectiveness of the mitigation measure in reducing expected damage (25%, 50%, or 100%, for example); and (5) expected avoided damage (the product of expected annual damage and effectiveness). The relationship of these variables is illustrated in Table 1. Although riverine flooding is used in the example, this model applies to other natural hazards as well.

Table 1. *The relationship of variables in calculating the benefit-cost ratio (BCR) of riverine mitigation projects.*

Flood Depth (ft) (a)	Scenario Damages (b)	Annual Probability (c)	Expected Annual Damage (b x c) (d)	Mitigation Effectiveness (e)	Expected Avoided Damage (d x e) (f)
1	$20k	10%	$2,000	100%	$2,000
2	$25k	5%	$1,250	80%	$1,000
3	$35k	2%	$700	50%	$350
4	$50k	1%	$500	25%	$125
		Total: $4,450		Total: $3,475	

An Example

Note that there are three different types of damage to consider in the example: scenario damage, expected annual damage, and expected annual avoided damage.

In this example, the scenario damage (column b) indicates the expected damage each time a flood of given depth (column a) from 1 to 4 feet occurs at

the residence. Scenario damage is not dependent on how frequently such floods are expected to occur. The annual flood probabilities (column c) indicate the degree of flood risk at the site under consideration. The expected annual damage (column d) is the product of scenario damage and annual flood probability (columns b and c).

The expected annual damage ($4,450 in this example (column d)) is the best estimate of the *average* damage per year expected at the site. These estimates do not mean that such damage will occur every year. The expected annual damages are those *without* undertaking the mitigation measure. The effectiveness of the mitigation measure (column e) is an estimate of how much expected damage will be reduced by the mitigation measure under consideration. The expected avoided damage (i.e., the benefits (column f)) is the product of expected annual damage and the effectiveness of the mitigation measure (columns d and e). The expected *avoided* damage ($3,475 in this example) is the expected benefit of undertaking the mitigation measure. After discounting to the net present value, the BCR is calculated by dividing the benefit by the cost. If the BCR is less than 1.0, then the feasibility of the project should be questioned. On the other hand, if the BCR is greater than 1.0, then the project is feasible. The BCR thus determined, the analyst has developed a powerful argument with numberable applications[8].

Data Needs

In carrying out the CE assessment, the analyst needs key pieces of information and a scientific calculator, or a computer program (available this year from FEMA) that performs the actual calculations. In the case of flooding, examples of needed information include hydraulic information (including flood discharges), the structure's first floor elevation, function, type, and size (single-family, wood frame, square footage), the effectiveness of the mitigation measure, the life of the mitigation measure in years, and the cost. FEMA's computer program automatically performs regression analyses to determine the likelihood of floods and damage to the structure and contents at various discharges, and then calculates the net present value of benefits and costs to arrive at the BCR.

[8]The CE assessment can be used "vertically" and "horizontally". That is, vertically in the sense of studying a single project to compare the BCR of alternative measures and selecting the most prudent measure, or horizontally for multiple projects to compare the BCR of projects and selecting among the most prudent projects.

Conclusion

Assessing the CE of proposed mitigation projects suggests the ability to peer into the future. In many important ways, the CE approach provides a crystal ball for the analyst to see the damage that is likely before a home is placed in a floodprone location, for example. This capability constitutes a prospective approach to floodplain management. The value of this capability is only beginning to be appreciated and explored. What is the impact of CE assessment on state and local hazard mitigation planning? On setting priorities when only limited public funds are available for hazard mitigation? On refining insurance rates? On ordinance administration? On the ability of the analyst to advise decision-makers? These are but a few of the questions generated by the ability to conduct CE assessments in natural hazard management.

INNOVATIVE PROCEDURES FOR FUNDING FLOODPLAIN STUDIES: COST, TIME, AND RESOURCE SHARING

Lawrence Basich
Federal Emergency Management Agency Region X

Introduction

For the past 10 years or so, the Flood Insurance Study budget for the entire country has just hit the eight-figure mark and has held that mark fairly consistently. With this budget, the Federal Emergency Management Agency has been able to finish initiating and continue to upkeep studies in over 18,000 communities across the United States and Commonwealth countries. At slightly over $500 per community per year, this is a pretty amazing feat.

However, as is true with all public agencies, our budget undergoes scrutiny, and the pot may get smaller in the future. Even if the funding level stays the same, the needs far outweigh the means. The purpose of this paper is to examine other existing means of meeting our study needs.

Discussion

How do we continue to keep all of the existing studies up to date? It is called magic and a very long priority list. In our region alone, we have identified over 180 restudy needs. They fall into several categories: fixing errored detail studies; fixing grossly overstated Approximate A zones; extending detailed study into previously unstudied areas; adding detailed study where no study was thought of before because of a change in demographics; and just updating worn out studies, mainly those whose discharges no longer reflect reality.

We have five basic sources for identifying study areas: first, the community officials themselves; second, as a result of good coordination between the local governments and the states, our state coordinators recommend study areas; third, through our close working relationship with the Corps of Engineers and other federal agencies, many recommendations for studies arise from their internal sources; fourth, as a result of Community Assistance Visits, FEMA staff identifies problem areas; and last, FEMA staff identify problem areas and study needs through our normal dealings with local communities and our daily activities in and out of the office.

The real trick is prioritizing the list of studies and picking 10 studies or so out of the 180 on the list. Since March of 1993, we have received over 35 requests for studies, so the list grows faster than it can be depleted. We started a process two years ago that involves our state coordinators during one of our semi-annual state coordinators meetings. We ask each coordinator to identify the top three study needs in their state. With this list and our list, we hammer out a final studies priority list. With increased interest from the Corps and local communities, this year we will pursue developing a studies task force whereby we can exchange ideas, needs, and information to come up with a more cogent, meaningful list.

In the past 11 years, our regional monies available for studies have dwindled from over $1.7 million per year to around $390,000 per year. Because of the increased need for quick fixes, most of our monies are set aside into a pot called Limited Map Maintenance Program (LMMP). With the scene changing to one of less funding and quick fix type studies, our mode of approaching getting the studies job done has changed. We see an increased need for searching for any mechanism available to meet the study update need.

I would like to focus on the different mechanisms for getting studies done. The following focus not only on cost share but time and resource sharing as well.

1) The first mechanism is, and probably always will be, the FEMA study/restudy/LMMP funds. Currently we cycle about $10 million a year through our procurement process.

2) Section 60.3(b)3 of the National Flood Insurance Program regulations requires that new base flood elevation data be included in new proposals for development of 5 acres or 50 lots, whichever is less. The purpose of this regulation was to assure that our maps would be updated by developers as the development pressures entered areas that could not have been foreseen at the time of the study initiation.

3) State organizations have set aside monies for getting projects started. In Washington, the Department of Ecology (DOE), through FCAAP, has provided monies for comprehensive planning, of which a portion may be used for studies. Use of these funds requires examination by a state committee and then cooperation by the local government. For example, studies have been cost shared with FEMA on the Methow River in Okanogan County; DOE funded studies on alluvial fans in Wenatchee. On this study, the FEMA regional office helped write the scope of work for the project, sat on the contractor selection board, interviewed prospective consultants, and has offered to help monitor the contract for the City; DOE funded a 2-D model of the main stem of the

Nooksack River in Whatcom County. The FEMA regional office participated on the contractor selection committee and helped write the scope of work for the contract. As you can see, there is a commitment of help in these last two cases with no funding attached. We view this as one of our most common forms of cost sharing.

4) The Corps of Engineers is providing technical assistance monies to totally fund studies. The Walla Walla District totally funded a reanalysis of the effect of development in a suspended community, when we made it clear that we could not set a high priority on funding that community study. The community has since joined the NFIP, thanks to this reanalysis and our coordination with the community. In Pendleton, Oregon, the local government unknowingly sited a proposed Emergency Operations Center in the 500-year floodplain. We asked the Corps to reexamine the model and they were able to determine that the levees contained the 500-year flood. The Corps, Portland District, has been digitizing the floodplain overlays for the major metropolitan areas in Oregon. This was an added benefit to an existing RFIS in Salem and an LMMP in Washington County, Oregon. The Seattle District has performed nearly 40% of the studies in their District. We constantly receive updates and revisions to existing FIS work that they perform on their own initiative.

5) Saving money on studies does not necessarily mean saving money out of the regional study money pot. It costs a significant amount of technical evaluation contractor (TEC) review time to process a study. In two instances, the Teton River in Madison County, Idaho, and four alluvial fan studies in Boise, Idaho, we saved those TEC review costs by having the TEC perform the studies for us. Unfortunately, with the ever-increasing work load of the TEC, we do not expect to receive this type of assistance in the future unless there are very special circumstances.

6) We have had limited success with cost sharing with local communities other than for mapping. In two instances in Washington, we were able to piggyback two studies on streams that the locals were performing. This type of cost share only happens when we know that a community is funding a study, and we have an interest and money to fund the remainder of the project.

7) King County, Washington, funds studies totally on its own. We consider ourselves extremely fortunate to have a community who recognizes the same needs that we do, and has established a yearly

budget to fund these types of studies. To date, the County has funded projects on the Raging River, Middle Fork Snoqualmie River, Tolt River, and South Fork Snoqualmie River. These are all large watercourses near urbanizing areas. Our role in these projects is one of coordination with the county and its contractor to assure conformance with our "Guidelines and Specifications." No other community in our region has this study capability planned in their budget.

7) As in most regions, we have a few communities who do not believe our studies. They have expressed this opinion by not joining the NFIP. Instead of leaving these communities alone, the regional office has offered to perform some minor hydrologic and hydraulic investigations to determine if the study needs to be refined. This type of technical assistance goes a long way in helping convince the non-believers, and helps us see their side of the story. The region is also looking at enhancing existing studies where study monies are not available.

8) The last type of money-saving exercise we use is to provide extensive technical assistance to clients who are seeking improvements to our study data. The Clackamas County Regional Park and the Tri-Met Light Rail project in the Portland metro areas are good examples. In both cases, a community and a pseudo-governmental agency had proposals for projects in the 100-year floodplain. Both groups performed hydrologic analyses and arrived at different discharge values than that shown in the FIS. In order to get their projects going, they had to obtain Conditional Letters of Map Revision, which meant close contact with the regional office of FEMA and the TEC. We were able to have four streams reanalyzed in Clackamas County and three updates along the light rail project, with only review costs being expended.

Conclusion

I suppose the simplest way to conclude this topic is to say we must always have our ears and eyes open to each of our client groups, states, local communities, each other, and developers. By satisfying their needs, we most often satisfy our own as well.